

**IN THE UNITED STATES COURT OF APPEALS
FOR THE THIRD CIRCUIT**

Docket Nos. 18-2012, 18-2225, 18-2249, 18-2253, 18-2281,
18-2332, 18-2416, 18-2417, 18-2418, 18-2419, 18-2422,
18-2650, 18-2651, 18-2661, 18-2724, and 19-1385

In re National Football League Players' Concussion Injury Litigation

**JOINT APPENDIX
Volume VIII of XIII, Pages JA4551-JA5514**

On appeal from Orders of the United States District Court for
the Eastern District of Pennsylvania (Hon. Anita B. Brody),
in No. 2:14-md-02323-AB and MDL No. 2323

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TABLE OF CONTENTS

	<u>Page</u>
Dkt. 9960, Aldridge Objectors' Notice of Appeal, filed May 3, 2018	JA1
Dkt. 10036, Aldridge Objectors' Notice of Appeal, filed June 1, 2018	JA6
Dkt. 10043, Objector Miller's Notice of Appeal, filed June 6, 2018	JA11
Dkt. 10044, Objector Anderson's Notice of Appeal, filed June 6, 2018	JA13
Dkt. 10075, Mitnick Law Office's Notice of Appeal, filed June 8, 2018	JA15
Dkt. 10079, Anapol Weiss, P.C.'s Notice of Appeal, filed June 15, 2018	JA17
Dkt. 10095, Kreindler & Kreindler, LLP's Notice of Appeal, filed June 22, 2018	JA19
Dkt. 10097, Faneca Objectors' Notice of Appeal, filed June 22, 2018	JA21
Dkt. 10099, Zimmerman Reed LLP's Notice of Appeal, filed June 22, 2018	JA24
Dkt. 10101, Armstrong Objectors' Notice of Appeal, filed June 25, 2018	JA27
Dkt. 10102, Pope McGlamry, P.C.'s Notice of Appeal, filed June 25, 2018	JA29
Dkt. 10133, Faneca Objectors' Amended Notice of Appeal, filed July 13, 2018.....	JA32
Dkt. 10142, Anapol Weiss, P.C.'s Notice of Appeal, filed July 17, 2018.....	JA35

Dkt. 10164, Aldridge Objectors' Notice of Appeal, filed July 24, 2018.....	JA37
Dkt. 10166, Kreindler & Kreindler, LLP's Notice of Appeal, filed July 25, 2018.....	JA40
Dkt. 10188, Class Counsel Locks Law Firm's Notice of Appeal, filed Aug. 2, 2018	JA42
Dkt. 10428, Aldridge Objectors' Notice of Appeal, filed Feb. 15, 2019	JA45
Dkt. 9860, Memorandum Opinion regarding: Total Amount of Common-Benefit Attorneys' Fees, filed Apr. 5, 2018	JA48
Dkt. 9861, Order regarding: Total Amount of Common-Benefit Attorneys' Fees, filed Apr. 5, 2018.....	JA68
Dkt. 9862 Memorandum Opinion regarding: IRPA Fee Cap, filed Apr. 5, 2018	JA70
Dkt. 9863, Order regarding: IRPA Fee Cap, filed Apr. 5, 2018.....	JA80
Dkt. 9876, Order regarding: Payments of Incentive Awards and Expenses, filed Apr. 12, 2018	JA82
Dkt. 10019, Explanation and Order regarding: Allocation of Common-Benefit Attorneys' Fees, filed May 24, 2018	JA84
Dkt. 10042, Order regarding: Alexander Objectors' Motion for Reconsideration/New Trial, filed June 5, 2018	JA111
Dkt. 10103, Order regarding: Payment of Attorneys' Fees and Expenses, filed June 27, 2018.....	JA113
Dkt. 10104, Order regarding: Withholdings for Common Benefit Fund, filed June 27, 2018.....	JA115
Dkt. 10127, Order Denying Locks Law Firm's Motion for Reconsideration of the Court's Explanation and Order, filed July 10, 2018.....	JA117
Dkt. 10378, Explanation and Order, filed Jan. 16, 2019	JA118

Civil Docket for Case No.: 2:12-md-2323-AB (E.D. Pa.).....	JA127
Dkt. 4, Case Management Order No. 1, filed Mar. 6, 2012	JA693
Dkt. 52, Order Modifying Case Management Order No.1, filed Apr. 2, 2012	JA718
Dkt. 64, Case Management Order No. 2, filed Apr. 26, 2012.....	JA721
Dkt. 71, Transcript of Apr. 25, 2012 Organizational Courtroom Conference, filed May 10, 2012	JA726
Dkt. 72, Case Management Order No. 3, filed May 11, 2012.....	JA764
Dkt. 2583, Stipulation and Order regarding: Scheduling, filed July 16, 2012.....	JA767
Dkt. 2642, Plaintiffs' Amended Master Administrative Long-Form Complaint, filed July 17, 2012.....	JA773
Dkt. 3384, Order Denying Plaintiffs' Motion for Discovery, filed Aug. 21, 2012	JA863
Dkt. 3587, Order regarding: Appointment of Defendant's Co-Liaison Counsel, filed Aug. 29, 2012	JA864
Dkt. 3698, Plaintiffs' Uncontested Motion for Order Establishing a Time and Expense Reporting Protocol and Appointing Auditor, filed Sept. 7, 2012	JA865
Dkt. 3710, Order Granting Plaintiffs' Uncontested Motion for Order Establishing a Time and Expense Reporting Protocol, filed Sept. 11, 2012	JA948
Dkt. 4135, Order Granting Plaintiffs' Uncontested Motion for Extension of Deadline To File Initial Time Expense Reports, filed Oct. 31, 2012.....	JA960
Dkt. 4143, Order Granting Plaintiffs' Uncontested Motion for Additional Extension of Deadline To File Initial Time and Expense Reports, filed Nov. 8, 2012	JA961

Dkt. 5128, Order regarding: Appointment of a Mediator, filed July 8, 2013.....	JA962
Dkt. 5235, Order regarding: Proposed Settlement, filed Aug. 29, 2013	JA964
Dkt. 5634, Motion of Proposed Co-Lead Counsel for Preliminary Approval of the Class Settlement Agreement, filed Jan. 6, 2014.....	JA966
Dkt. 5634-2, Exhibit B, Class Action Settlement Agreement.....	JA1003
Dkt. 5657, Memorandum Opinion Denying Preliminary Approval, filed Jan. 14, 2014	JA1471
Dkt. 5658, Order Denying Preliminary Approval Without Prejudice, filed Jan. 14, 2014	JA1483
Dkt. 5910, Order regarding: Court's Jan. 14, 2014 Order, filed Apr. 16, 2014	JA1484
Dkt. 5911, Stipulation and Order regarding: Apr. 15, 2014 Order, filed Apr. 16, 2014	JA1485
Dkt. 6019, Faneca Objectors' Motion To Intervene filed May 5, 2014	JA1487
Dkt. 6019-1, Memorandum of Law in Support	JA1572
Dkt. 6073, Co-Lead Class Counsel's Motion for Order Granting Preliminary Approval of Class Action Settlement, filed June 25, 2014.....	JA1639
Dkt. 6073-4, Declaration of Mediator and Former United States District Court Judge Layn R. Phillips in Support of Preliminary Approval of Settlement, filed June 25, 2014	JA1929
Dkt. 6082, Response in Opposition to Motion for Approval of Class Action Settlement, filed July 2, 2014	JA2041
Dkt. 6083, Memorandum Opinion Granting Preliminary Approval, filed July 7, 2014.....	JA2160
Dkt. 6084, Order Granting Preliminary Approval, filed July 7, 2014.....	JA2121

Dkt. 6087, Class Action Settlement Agreement as of June 25, 2014, filed July 7, 2014.....	JA2151
Dkt. 6107, Order Denying Faneca Objectors' Motion To Intervene, filed July 29, 2014.....	JA2313
Dkt. 6109, Faneca Objectors' Reply in Further Support of Motion To Intervene, filed July 29, 2014	JA2314
Dkt. 6126, Response in Opposition regarding: Plaintiffs' Motion for Extension of Time To File Response/Reply to Motion To Permit Access to Medical, Actuarial, and Economic Information, filed Aug. 8, 2014.....	JA2330
Dkt. 6160, Order Directing Special Master To File Actuarial Reports and Supplemental Information or Tabulations, filed Sept. 8, 2014	JA2333
Dkt. 6166, Order Denying Petition of Objecting Class Members for Leave to Appeal District Court's Order Granting Settlement, filed Sept. 11, 2014	JA2334
Dkt. 6167, NFL Concussion Liability Forecast, filed Sept. 12, 2014	JA2336
Dkt. 6167-1, Exhibit A, Supplemental Schedules	JA2407
Dkt. 6167-2, Exhibit B, Supplemental Schedules	JA2409
Dkt. 6167-3, Exhibit C, Supplemental Schedules	JA2411
Dkt. 6167-4, Exhibit D, Supplemental Schedules	JA2466
Dkt. 6168, Report of the Segal Group to Special Master Perry Golkin, filed Sept. 12, 2014	JA2468
Dkt. 6168-1, Exhibit A, Part 1, Player Database	JA2522
Dkt. 6168-2, Exhibit A, Part 2, Player Database	JA2677
Dkt. 6168-3, Exhibit B, Plaintiff's Sample Data	JA2809
Dkt. 6168-4, Exhibit C, Screenshot of Plaintiff's Database.....	JA2879

Dkt. 6168-5, Exhibit D, Screenshot of Model Assumptions as Entered into Model	JA2881
Dkt. 6168-6, Exhibit E, Cash Flow Analysis	JA2884
Dkt. 6168-7, Exhibit F, Supplemental Schedules.....	JA2889
Dkt. 6169, Faneca Objectors' Motion for Discovery, filed Sept. 13, 2014	JA2960
Dkt. 6169-1, Memorandum of Law in Support of Motion for Limited Discovery.....	JA2963
Dkt. 6169-2, Exhibit A, Limited Discovery Requests.....	JA2977
Dkt. 6169-3, Exhibit B, Information on NFL Football Concussions	JA2996
Dkt. 6201, Faneca Objectors' Objections, filed Oct. 14, 2014.....	JA3003
Dkt. 6201-1, Declaration of Eric R. Nitz, filed Oct. 6, 2014.....	JA3128
Dkt. 6201-2, Exhibits 1-5	JA3143
Dkt. 6201-3, Exhibits 6-8	JA3184
Dkt. 6201-4, Exhibits 9-12	JA3214
Dkt. 6201-5, Exhibits 13-15	JA3286
Dkt. 6201-6, Exhibits 16-25	JA3385
Dkt. 6201-7, Exhibits 26-30	JA3405
Dkt. 6201-8, Exhibits 31-36	JA3434
Dkt. 6201-9, Exhibits 37-44	JA3463
Dkt. 6201-10, Exhibits 45-51	JA3492
Dkt. 6201-11, Exhibits 52-59	JA3571
Dkt. 6201-12, Exhibits 60-66	JA3752
Dkt. 6201-13, Exhibits 67-71	JA3752

Dkt. 6201-14, Exhibits 72-76	JA3776
Dkt. 6201-15, Exhibits 77-82	JA3819
Dkt. 6201-16, Declaration of Robert A. Stern, filed Oct. 6, 2014.....	JA3858
Dkt. 6201-17, Declaration of Sean Morey, filed Oct. 6, 2014	JA3919
Dkt. 6211, Faneca Objectors' Motion for Leave To File a Reply in Support of Motion for Leave To Conduct Limited Discovery, filed Oct. 13, 2014.....	JA3923
Dkt. 6211-1, Memorandum of Law in Support of Movants' Motion for Leave To File	JA3926
Dkt. 6232, Faneca Objectors' Supplemental Objections, filed Oct. 14, 2014.....	JA3928
Dkt. 6232-1, Declaration of Sam Gandy and Exhibits	JA3933
Dkt. 6233, Armstrong Objectors' Amended Objection to the June 25, 2014 Class Action Settlement Agreement, filed Oct. 14, 2014	JA3971
Dkt. 6233-1, Declaration of Drs. Brent E. Masel and Gregory J. O'Shanick in Support of BIAA's Motion for Leave to File <i>Amicus Curiae</i> Brief	JA4037
Dkt. 6233-2, Declaration of Richard L. Coffman.....	JA4049
Dkt. 6233-3, Declaration of Mitchell Toups	JA4051
Dkt. 6233-4, Declaration of Jason Webster.....	JA4053
Dkt. 6237, Aldridge Objectors' Objections to June 25, 2014 Class Action Settlement Agreement, filed Oct. 14, 2014.....	JA4055
Dkt. 6244, Faneca Objectors' Motion To Set Scheduling Conference Before Nov. 19, 2014, filed Oct. 15, 2014.....	JA4066
Dkt. 6252, Faneca Objectors' Motion for Production of Evidence, filed Oct. 21, 2014.....	JA4073

Dkt. 6339, Faneca Objectors' Notice regarding: Intent To Appear at Fairness Hearing, filed Nov. 3, 2014	JA4078
Dkt. 6344, Order that Steven Molo Will Coordinate the Arguments of the Objectors at the Fairness Hearing, filed Nov. 4, 2014	JA4111-1
Dkt. 6353, Letter from Mitchell A. Toups to Judge Brody dated Sept. 3, 2014 regarding: Objection to June 25, 2014 Class Action Settlement by Armstrong Objectors, filed Nov. 3, 2014	JA4112
Dkt. 6420, Faneca Objectors' Supplemental Objections., filed Nov. 11, 2014	JA4144
Dkt. 6423-5, Declaration of Orran L. Brown, Sr., filed Nov. 12, 2014	JA4157
Dkt. 6423-6, Supplemental Declaration of Mediator and Former United States District Court Judge Layn R. Phillips in Support of Final Approval of Settlement and Certification Class and Subclasses, filed November 12, 2014	JA4236
Dkt. 6423-17, Declaration of Kenneth C. Fischer, M.D., filed Nov. 12, 2014	JA4249
Dkt. 6423-18, Declaration of Christopher C. Giza, M.D., filed Nov. 12, 2014	JA4267
Dkt. 6423-19, Declaration of David Allen Hovda, Ph.D., filed Nov. 12, 2014	JA4316
Dkt. 6423-20, Declaration of John G. Keilp, Ph.D., filed Nov. 12, 2014	JA4405
Dkt. 6423-21, Declaration of Thomas Vasquez, Ph.D., filed Nov. 12, 2014	JA4452
Dkt. 6425, Faneca Objectors' Statement regarding: Fairness Hearing, filed Nov. 14, 2014	JA4539
Dkt. 6428, Notice of Counsel Permitted To Speak at Fairness Hearing, filed Nov. 17, 2014	JA4542

Dkt. 6434, Faneca Objectors' Objections, filed Nov. 18, 2014	JA4544
Dkt. 6435, Faneca Objectors' Statement regarding: Nov. 19, 2014 Fairness Hearing, filed Nov. 18, 2014	JA4550
Dkt. 6455, Post-Fairness Hearing Supplemental Briefing of Objectors regarding: Faneca Objectors' Motion for Final Order and Judgment, filed Dec. 2, 2014	JA4551
Dkt. 6455-1, Supplemental Declaration of Robert Stern, filed Dec. 2, 2014	JA4591
Dkt. 6455-2, Supplemental Declaration of Sam Gandy and Exhibits, filed Dec. 2, 2014	JA4598
Dkt. 6455-3, Declaration of Patrick Hof and Exhibit, filed Dec. 2, 2014	JA4647
Dkt. 6455-4, Declaration of Jing Zhang and Exhibit, filed Dec. 2, 2014	JA4769
Dkt. 6455-5, Declaration of Martha Shenton and Exhibit, filed Dec. 2, 2014	JA4792
Dkt. 6455-6, Declaration of Charles Bernick and Exhibit, filed Dec. 2, 2014	JA4926
Dkt. 6455-7, Declaration of Michael Weiner and Exhibit, filed Dec. 2, 2014	JA4940
Dkt. 6455-8, Declaration of James Stone and Exhibit, filed Dec. 2, 2014	JA5099
Dkt. 6455-9, Declaration of Thomas Wisniewski and Exhibit, filed Dec. 2, 2014	JA5125
Dkt. 6455-10, Declaration of Steven T. DeKosky and Exhibit, filed Dec. 2, 2014	JA5176
Dkt. 6455-11, Declaration of Wayne Gordon and Exhibit, filed Dec. 2, 2014	JA5230

Dkt. 6455-12, Supplemental Declaration of Eric Nitz, filed Dec. 2, 2014	JA5270
Dkt. 6455-13, Exhibits 1-9	JA5275
Dkt. 6455-14, Exhibits 10-18	JA5365
Dkt. 6455-23, Exhibits 20-27	JA5457
Dkt. 6461, Faneca Objectors' Motion for Disclosure of Documents Relevant to Fairness of Settlement, filed Dec. 9, 2014	JA5508
Dkt. 6462, Faneca Objectors' Motion for Disclosure of Financial Relationships with Experts, filed Dec. 9, 2014.....	JA5515
Dkt. 6463, Amended Transcript of Nov. 19, 2014 Fairness Hearing, filed Dec. 11, 2014.....	JA5522
Dkt. 6469, Faneca Objectors' Notice regarding: Fairness Hearing Slides, filed Dec. 22, 2014	JA5774
Dkt. 6470, Faneca Objectors' Notice regarding: Supplemental Authority, filed Dec. 23, 2014	JA5814
Dkt. 6470-1, Memorandum Opinion and Order	JA5818
Dkt. 6479, Order Directing Settling Parties To Address Certain Issues by Feb. 13, 2015, filed Feb. 2, 2015	JA5839
Dkt. 6481, Class Counsel and the NFL Parties' Joint Submission regarding: Feb. 2, 2015 Order, filed Feb. 13, 2015	JA5842
Dkt. 6481-1, Exhibit A, Class Action Settlement Agreement (As Amended).....	JA5853
Dkt. 6481-2, Exhibit B, Redline Class Action Settlement Agreement (As Amended)	JA6015
Dkt. 6503, Armstrong Objectors' Supplemental Objection to the Amended Class Action Settlement, filed Apr. 13, 2015.....	JA6124
Dkt. 6508, Order Ruling on Various Motions, filed Apr. 21, 2015	JA6129

Dkt. 6509, Memorandum Opinion regarding: Final Approval of Amended Settlement, filed Apr. 22, 2015	JA6131
Dkt. 6510, Final Order and Judgment regarding: Final Settlement Approval, filed Apr. 22, 2015	JA6263
Dkt. 6534, Amended Final Order and Judgment, filed May 8, 2015	JA6270
Dkt. 6535, Order regarding: Amended Final Order, filed May 11, 2015	JA6278
Dkt. 7070, Faneca Objectors' Petition for an Award of Attorneys' Fees, filed Jan. 11, 2017.....	JA6280
Dkt. 7070-1, Memorandum of Law in Support, filed Jan. 11, 2017	JA6283
Dkt. 7070-2, Declaration of Steven Molo, filed Jan. 11, 2017	JA6338
Dkt. 7151, Co-Lead Class Counsel's Petition for an Award of Attorneys' Fees, filed Feb. 13, 2017.....	JA6555
Dkt. 7151-1, Memorandum of Law in Support, filed Feb. 13, 2017	JA6558
Dkt. 7151-2, Declaration of Christopher Seeger, filed Feb. 13, 2017	JA6640
Dkt. 7151-6, Declaration of Levin Sedran & Berman, filed Feb. 13, 2017	JA6723-1
Dkt. 7151-7, Declaration of Gene Locks, filed Feb. 13, 2017	JA6724
Dkt. 7151-8, Declaration of Steven C. Marks, filed Feb. 13, 2017	JA6755
Dkt. 7151-10, Declaration of Sol H. Weiss, filed Feb. 13, 2017	JA6785
Dkt. 7151-18, Exhibit O, Declaration of Samuel Issacharoff, filed Feb. 13, 2017	JA6814

Dkt. 7151-27, Exhibit X, Declaration of Charles Zimmerman, filed Feb. 13, 2017	JA6849
Dkt. 7151-28, Exhibit Y, Brian T. Fitzpatrick, <i>An Empirical Study of Class Action Settlements and Their Fee Awards</i> , JOURNAL OF EMPIRICAL LEGAL STUDIES (Dec. 2010), filed Feb. 13, 2017	JA6883
Dkt. 7161, Miller Objector's Opposition to Co-Lead Class Counsel's Fee Petition, filed Feb. 17, 2017	JA6920
Dkt. 7176, Alexander Objectors' Motion for Entry of Case Management Order Governing Applications for Attorney Fees, filed Feb. 21, 2017	JA6933
Dkt. 7228, Co-Lead Class Counsel's Motion for Extension of Time To File Response/Reply Memorandum in Support of Their Fee Petition and To Set Coordinated Briefing Schedule, filed Feb. 28, 2017	JA6943
Dkt. 7229, Objector Miller's Response in Opposition to Fee Applications and Co-Lead Class Counsel's Motion To Set Coordinated Briefing Schedule, filed Mar. 1, 2017.....	JA6948
Dkt. 7230, Armstrong Objectors' Petition for an Award of Attorneys' Fees, filed Mar. 1, 2017	JA6951
Dkt. 7231, Objector Miller's Corrected Response in Opposition to Fee Applications and Co-Lead Class Counsel's Motion To Set Coordinated Briefing Schedule, filed Mar. 1, 2017.....	JA6954
Dkt. 7232, Armstrong Objectors' Memorandum of Law in Support of Petition for an Award of Attorneys' Fees, filed Mar. 1, 2017.....	JA6957
Dkt. 7232-1, Exhibit A, Declaration of Richard L. Coffman in Support of the Armstrong Objectors' Petition for Award of Attorneys' Fees	JA6992
Dkt. 7232-2, Exhibit B, Declaration of Mitchell A. Toups in Support of the Armstrong Objectors' Petition for Award of Attorneys' Fees.....	JA6998

Dkt. 7232-3, Exhibit C, Declaration of the Webster Law Firm in Support of the Armstrong Objectors' Petition for an Award of Attorneys' Fees	JA7007
Dkt. 7232-4, Exhibit D, Declaration of the Warner Law Firm in Support of the Armstrong Objectors' Petition for an Award of Attorneys' Fees	JA7009
Dkt. 7233, Faneca Objectors' Response to Motion regarding: Co-Lead Class Counsel's Motion for Extension of Time, filed Mar 1, 2017	JA7014
Dkt. 7237, Anderson Objector's Supplemental Objection to Faneca Objector's to Fee Petition, filed Mar. 1, 2017	JA7017
Dkt. 7238, Order Granting Co-Lead Class Counsel's Motion for Extension of Time, filed Mar. 2, 2017.....	JA7022
Dkt. 7259, Stipulation and Proposed Order by NFL, Inc., NFL Properties LLC, Plaintiff(s), filed Mar. 8, 2017.....	JA7023
Dkt. 7261, Order regarding: Co-Lead Class Counsel's Fee Petition, filed Mar. 8, 2017.....	JA7026
Dkt. 7324, Order Considering the Uncontested Motion of Co-Lead Class Counsel for Order in Aid of Implementation of the Settlement Program, filed Mar. 23, 2017.....	JA7028
Dkt. 7344, Memorandum in Opposition to Co-Lead Class Counsel's Petition for an Award of Attorneys' Fees, filed Mar. 27, 2017.....	JA7036
Dkt. 7346, Memorandum in Opposition to Co-Lead Class Counsel's Petition for an Award of Attorneys' Fees, filed Mar. 27, 2017.....	JA7046
Dkt. 7350, Response Objection and Memorandum in Opposition to Co-Lead Counsel's Petition for an Award of Attorneys' Fees, filed Mar. 27, 2017.....	JA7059
Dkt. 7354, Aldridge Objectors' Objections regarding: Co-Lead Class Counsel's Application for an Award of Attorneys' Fees, filed Mar. 27, 2017.....	JA7073

Dkt. 7355, Aldridge Objectors' Objections regarding: Co-Lead Class Counsel's Application for an Award of Attorneys' Fees, filed Mar. 27, 2017.....	JA7076
Dkt. 7356, Certain Plaintiffs' Response in Opposition to Petition for Adoption of Set-Aside of Five Percent of Each Monetary Award and Derivative Claimant Award, filed Mar. 27, 2017	JA7145
Dkt. 7360, Objection by Plaintiff(s) to Request for Attorneys' Fees and Holdback, filed Mar. 27, 2017	JA7150
Dkt. 7363, Notice of Joinder in Estate of Kevin Turner's Response and Limited Opposition to Co-Lead Counsel's Petition for an Award of Attorneys' Fees, filed Mar. 27, 2017.....	JA7160
Dkt. 7364, Application/Petition of Objectors Preston and Katherine Jones for Award of Attorneys' Fees, filed Mar. 27, 2017	JA7167
Dkt. 7366, Faneca Objectors' Preliminary Response in Support regarding: Petition for an Award of Attorney Fees and in Response to Dkts. 7151, 7161, 7230 and 7237, filed Mar. 27, 2017	JA7170
Dkt. 7366-1, Exhibit A, Declaration of Joseph Floyd	JA7188
Dkt. 7366-2, Exhibit B, Armstrong Objectors' Memorandum of Law.....	JA7223
Dkt. 7366-3, Exhibit C, Revised Summary of Expenses	JA7259
Dkt. 7367, Plaintiffs' Joinder to Objections regarding: Co-Lead Counsel's Petition for an Award of Attorneys' Fees, filed Mar. 27, 2017	JA7261
Dkt. 7370, Anderson Objector's Second Supplemental Notice of Fee Objections, filed Mar. 27, 2017	JA7264
Dkt. 7373, Plaintiffs' Objections to Co-Lead Class Counsel's Request for Five Percent Set Aside, filed Mar. 27, 2017	JA7269
Dkt. 7375, Plaintiffs' Notice of Joinder in Objections to Co-Lead Class Counsel's Petition for Fees, Reimbursements, and Adoption of Set-Aside Award, filed Mar. 28, 2017	JA7275

Dkt. 7403, Order Granting Deandra Cobb's Motion To Accept Objection to Five Percent Set-Aside File, filed Mar. 29, 2017	JA7277
Dkt. 7404, Plaintiffs' Response Objection regarding: Co-Lead Class Counsel's Petition for Five Percent Set-Aside, filed Mar. 29, 2017	JA7278
Dkt. 7409, Plaintiffs' Motion for Extension of Time To File Answer, filed Mar. 29, 2017.....	JA7287
Dkt. 7446, Order That Pursuant to Federal Rules of Civil Procedure 72b Referring All Petitions for Individual Attorney' Liens, filed Apr. 4, 2017	JA7289
Dkt. 7453, Order Granting Motion To Accept Joinder in Objections to Co-Lead Class Counsel's Petition for Fees, filed Apr. 6, 2017	JA7290
Dkt. 7463, Response in Opposition regarding: Motion for Joinder, filed Apr. 10, 2017	JA7291
Dkt. 7464, Co-Lead Class Counsel's Memorandum in Support regarding: Fee Petition, filed Apr. 10, 2017	JA7308
Dkt. 7464-1, Supplemental Seeger Declaration, filed Apr. 10, 2017	JA7385
Dkt. 7464-2, Exhibit Z, Declaration of Bradford R. Sohn	JA7396
Dkt. 7464-3, Exhibit AA, Petition to Appeal	JA7404
Dkt. 7464-4, Exhibit BB, Reply in Support	JA7437
Dkt. 7464-5, Exhibit CC, Corrected Opening Brief.....	JA7456
Dkt. 7464-6, Exhibit DD, Appellants' Reply Brief.....	JA7529
Dkt. 7464-7, Exhibit EE, Class Opposition to Motion for Judicial Notice	JA7558
Dkt. 7464-8, Exhibit FF, Appellants' Opposition to Motion to Expedite Appeals	JA7570
Dkt. 7464-9, Exhibit GG, Petition for a Writ of Certiorari	JA7574
Dkt. 7464-10, Exhibit HH, Petitioner's Reply Brief.....	JA7615

Dkt. 7464-11, Exhibit II, U.S. Supreme Court Docket for <i>Armstrong v. NFL</i>	JA7630
Dkt. 7464-12, Exhibit JJ, An Updated Analysis of the NFL Concussion Settlement.....	JA7635
Dkt 7464-13, Exhibit KK, Declaration of Orran. L. Brown, Sr.....	JA7733
Dkt. 7533, Aldridge Objectors' Objections regarding: Co-Lead Class Counsel's Omnibus Reply, filed Apr. 21, 2017.....	JA7738
Dkt. 7534, Aldridge Objectors' Motion for Leave To Serve Fee- Petition Discovery, filed Apr. 21, 2017	JA7750
Dkt. 7550, Faneca Objectors' Reply to Response to Motion for Attorney Fees, filed Apr. 25, 2017	JA7756
Dkt 7550-1, Expert Declaration of Joseph J. Floyd, filed Apr. 25, 2017	JA7776
Dkt. 7555, Reply in Support regarding: Jones Objectors' Fee Petition, filed Apr. 26, 2017	JA7785
Dkt. 7605, Co-Lead Class Counsel's Motion To Strike Aldridge Objectors' Objections as Unauthorized Sur-Reply, filed May 5, 2017.....	JA7790
Dkt. 7606, Co-Lead Class Counsel's Memorandum of Law regarding: Aldridge Objectors' Motion for Discovery and Objections as Unauthorized Sur-Reply, filed May 5, 2017.....	JA7793
Dkt. 7608, Armstrong Objectors' Reply regarding: Their Attorneys' Fee Petition, filed May 5, 2017.....	JA7820
Dkt. 7621, Mitnick Law Office's Brief and Statement of Issues in Support of Request for Review of Objectors' Fee Petition, filed May 9, 2017	JA7828
Dkt. 7626, Aldridge Objectors' Response in Opposition regarding: Co-Lead Class Counsel's Motion To Strike Aldridge Objectors' Objections as Unauthorized Sur-Reply, filed May 12, 2017.....	JA7844

- Dkt. 7627, Aldridge Objectors' Memorandum of Law regarding: Co-Lead Class Counsel's Motion To Strike Aldridge Objectors' Objections as Unauthorized Sur-Reply, filed May 12, 2017 JA7847
- Dkt. 7708, Faneca Objectors' Reply to Response to Motion regarding: Faneca Objectors' Motion for Attorney Fees and Mitnick Law Office's Brief and Statement of Issues, filed May 18, 2017 JA7856
- Dkt. 7710, Co-Lead Class Counsel's Reply to Response to Motion regarding: Co-Lead Class Counsel's Motion To Strike Aldridge Objectors' Objections as Unauthorized Sur-Reply, filed May 19, 2017 JA7863
- Dkt. 8310, Order To Show Cause regarding: Fees and Expenses, filed Aug. 23, 2017 JA7872
- Dkt. 8327, Co-Class Counsel's Response to Order To Show Cause and Request for Clarification and Extension of Time, filed Aug. 28, 2017 JA7891
- Dkt. 8330, Notice by Plaintiff(s) regarding: Co-Lead Class Counsel's Fee Petition, filed Aug. 29, 2017 JA7895
- Dkt. 8350, Aldridge Objectors' Response regarding: Aug. 23, 2017 Order, filed Aug. 31, 2017 JA7898
- Dkt. 8354, Co-Lead Class Counsel's Response in Opposition regarding: Notice by Plaintiff(s) For Appointment of Magistrate, filed Sept. 5, 2017 JA7909
- Dkt. 8358, Order regarding: the Court's Continuing and Exclusive Jurisdiction under Article XXVII of the Amended Class Action Settlement, filed Sept. 7, 2017 JA7913
- Dkt. 8364, Reply to Co-Lead Class Counsel's Response to Request To Appoint Magistrate Judge, filed Sept. 11, 2017 JA7916
- Dkt. 8367, Order Directing the Filing of Declarations regarding: Proposed Fee Allocation, filed Sept. 12, 2017 JA7920
- Dkt. 8372, Notice regarding: Professor William B. Rubenstein's Appointment as Advisor to Plaintiff's Steering Committee, filed Sept. 13, 2017 JA7921

Dkt. 8376, Order Appointing Professor Rubenstein as an Expert Witness on Attorneys' Fees, filed Sept. 14, 2017.....	JA7923
Dkt. 8395, Aldridge Objectors' First Supplement in Support of Objections, filed Sept. 20, 2017.....	JA7926
Dkt. 8396, Aldridge Objectors' Motion To Compel Compliance with Case Management Order No. 5, filed Sept. 20, 2017	JA7931
Dkt. 8440, Co-Lead Class Counsel's Response in Opposition regarding: Aldridge Objectors' Motion To Compel, filed Oct. 4, 2017.....	JA7933
Dkt. 8447, Seeger Declaration regarding: Proposed Fee Allocation Order, filed Oct. 10, 2017	JA7943
Dkt. 8447-1, Exhibit to Declaration of Christopher A. Seeger in Support of Proposed Allocation	JA7965
Dkt. 8447-2, Declaration of Brian T. Fitzpatrick	JA7967
Dkt. 8448, Order Directing Filing of Counter-Declarations regarding: Attorneys' Fees, filed Oct. 12, 2017	JA7980
Dkt. 8449, Aldridge Objectors' Reply to Co-Lead Class Counsel's Response to Their Motion To Compel Compliance with Case Management Order No. 5, filed Oct. 12, 2017	JA7981
Dkt. 8470, Co-Lead Class Counsel's Motion for Order Directing the Claims Administrator To Withhold Any Portions of Class Member Monetary Awards, filed Oct. 23, 2017	JA7987
Dkt. 8532, Armstrong Objectors' Response to Class Counsel's Proposed Allocation of Common Benefit Attorneys' Fees, filed Oct. 25, 2017.....	JA7992
Dkt. 8556, Counter-Declaration of Jason E. Luckasevic regarding: Fee Allocation, filed Oct. 26, 2017.....	JA7996
Dkt. 8653, Declaration of Craig R. Mitnick regarding: Fee Allocation, filed Oct. 27, 2017.....	JA8005

Dkt. 8701, Co-Lead Class Counsel Anapol Weiss's Proposed Alternative Methodology for Fee Allocation, filed Oct. 27, 2017	JA8020
Dkt. 8709, Declaration of Gene Locks, Class Counsel, regarding: Fee Allocation, filed Oct. 27, 2017.....	JA8051
Dkt. 8719, Counter- Declaration of Thomas V. Girardi regarding: Fee Allocation, filed Oct. 27, 2017.....	JA8086
Dkt. 8720, Declaration of Anthony Tarricone in Opposition regarding: Fee Allocation, filed Oct. 27, 2017	JA8095
Dkt. 8720-1, Exhibit to Declaration of Anthony Tarricone	JA8107
Dkt. 8720-2, Kreindler & Kreindler LLP Opposition to Co-Lead Counsel's Petition for an Award of Common Benefit Attorneys' Fees	JA8109
Dkt. 8721, Declaration of Michael L. McGlamry regarding: Fee Allocation, filed Oct. 27, 2017.....	JA8122
Dkt. 8722, Declaration of Charles S. Zimmerman regarding: Fee Allocation, filed Oct. 27, 2017.....	JA8141
Dkt. 8723, Response by Neurocognitive Football Lawyers and The Yerid Law Firm In Support of Seeger Declaration regarding: Fee Allocation, filed Oct. 27, 2017.....	JA8158
Dkt. 8724, Declaration of Derriel C. McCorvey regarding: Fee Allocation, filed Oct. 27, 2017.....	JA8167
Dkt. 8725, Declaration of Lance H. Lubel regarding: Fee Allocation, filed Oct. 27, 2017.....	JA8179
Dkt. 8726, Faneca Objectors' Response in Opposition to Seeger Declaration regarding: Fee Allocation, filed Oct. 27, 2017	JA8192
Dkt. 8727, Declaration of James T. Capretz regarding: Fee Allocation, filed Oct. 27, 2017.....	JA8206
Dkt. 8728, Declaration of Steven C. Marks regarding: Fee Allocation, filed Oct. 27, 2017.....	JA8212

Dkt. 8900, Order Directing Filing of Omnibus Replies regarding: Counter-Declarations, filed Nov. 7, 2017	JA8215
Dkt. 8915, Notice by Class Counsel regarding: Settlement Implementation, filed Nov. 10, 2017	JA8216
Dkt. 8917, Notice by Mitnick Law Office, filed Nov. 10, 2017	JA8218
Dkt. 8929, Order regarding: Extension for Omnibus Reply, filed Nov. 17, 2017	JA8219
Dkt. 8934, Co-Lead Class Counsel's Omnibus Reply to Responses, Objections, and Counter-Declarations regarding: Fee Petition, filed Nov. 17, 2017	JA8221
Dkt. 8934-1, Supplemental Declaration of Brian T. Fitzpatrick, filed Nov. 17, 2017	JA8267
Dkt. 8937, Plaintiffs' Motion for Leave To File Sur-Reply Counter- Declaration of Jason E. Luckasevic regarding: Fee Allocation, filed Nov. 21, 2017	JA8270
Dkt. 8945, Zimmerman Reed LLP's Motion for Leave To File a Sur- Reply Declaration regarding: Fee Allocation, filed Nov. 22, 2017	JA8274
Dkt. 8963, Pope McGlamry, P.C.'s Motion for Leave To File Sur- Reply Declaration regarding: Fee Allocation, filed Nov. 28, 2017	JA8276
Dkt. 9508, Order Denying Motions for Leave To File Sur-Reply Declaration, filed Dec. 5, 2017	JA8279
Dkt. 9510, Order Denying the Aldridge Objectors' Motion To Compel Compliance with Case Management Order No. 5, filed Dec. 5, 2017	JA8280
Dkt. 9526, Export Report of Professor William B. Rubenstein, filed Dec. 11, 2017	JA8281
Dkt. 9527, Receipt of Expert's Report and Notice regarding: Rubenstein Report Responses, filed Dec. 11, 2017	JA8376

Dkt. 9536, Aldridge Objectors' Motion for Reconsideration regarding: Extension of Time for Rubenstein Report Responses Notice, filed Dec. 19, 2017	JA8378
Dkt. 9545, Response by the Locks Law Firm to Rubenstein Report, filed Jan. 2, 2018	JA8381
Dkt. 9547, Response by Goldberg, Persky and White, P.C.; Girardi Keese; and Russomanno & Borrello to Rubenstein Report, filed Jan. 3, 2018	JA8392
Dkt. 9548, Response by Anapol Weiss to Rubenstein Report, filed Jan. 3, 2018	JA8399
Dkt. 9549, Response by the Mokaram Law Firm; The Buckley Law Group; and The Stern Law Group to Rubenstein Report, filed Jan. 3, 2018	JA8402
Dkt. 9550, Response and Declaration of Robert A. Stein to Rubenstein Report, filed Jan. 3, 2018	JA8415
Dkt. 9551, Response by The Yerrid Law Firm and Neurocognitive Football Lawyers to Rubenstein Report, filed Jan. 3, 2018.....	JA8420
Dkt. 9552, Response by Co-Lead Class Counsel to Rubenstein Report, filed Jan. 3, 2018	JA8431
Dkt. 9552-1, Declaration of Christopher A. Seeger	JA8443
Dkt. 9553, Zimmerman Reed LLP's Joinder to the Response of the Locks Law Firm to the Rubenstein Report, filed Jan. 3, 2018	JA8455
Dkt. 9554, Response by the Aldridge Objectors to Rubenstein Report, filed Jan. 3, 2018	JA8457
Dkt. 9555, Notice of Joinder by Robins Cloud, LLP regarding: Responses to Rubenstein Report, filed Jan. 3, 2018.....	JA8469
Dkt. 9556, Response by Class Counsel Podhurst Orseck, P.A. to Rubenstein Report, filed Jan. 3, 2018	JA8471

- Dkt. 9561, Order regarding: Appointment of Dennis R. Suplee to Represent *pro se* Settlement Class Members Where There Has Been a Demonstrated Need for Legal Counsel, filed January 8, 2018. JA8476
- Dkt. 9571, Reply of Professor William B. Rubenstein to Reponses to Expert Report, filed Jan. 19, 2018 JA8477
- Dkt. 9576, Order Permitting Sur-Reply Filings in Response to Professor Rubenstein's Reply, filed Jan. 23, 2018 JA8493
- Dkt. 9577, Mitnick Law Office's First Motion To Compel, filed Jan 26, 2018 JA8494
- Dkt. 9581, Memorandum of Law regarding: Sur-Reply of NFL, Inc., and NFL Properties LLC to Rubenstein's Reply to Responses, filed Jan. 30, 2018 JA8498
- Dkt. 9587, Notice by Plaintiff(s) regarding: Sur-Reply of X1Law to Rubenstein's Reply to Responses, filed Jan. 30, 2018 JA8500
- Dkt. 9588, Notice by Plaintiff(s) regarding: Aldridge Objectors' Sur-Reply to Rubenstein's Reply to Responses, filed Jan. 30, 2018 JA8506
- Dkt. 9753-1, Exhibit A, Curriculum Vitae of Brian R. Ott, M.D. JA8513
- Dkt. 9753-2, Exhibit B, Curriculum Vitae of Mary Ellen Quiceno, M.D., F.A.A.N. JA8564
- Dkt. 9757, Order regarding: Joint Application by Co-Lead Class Counsel and Counsel for the NFL and NFL Properties, LLC for Appointment of Two Appeals Advisory Panel Members and Removal of One Appeals Advisory Panel Member, filed Mar. 6, 2018..... JA8577
- Dkt. 9760, Order Adopting Rules Governing Attorney's Liens, filed Mar. 6, 2018 JA8581
- Dkt. 9786, Class Counsel's Motion To Appoint the Locks Law Firm as Administrative Class Counsel, filed Mar. 20, 2018 JA8603
- Dkt. 9813, Pope McGlamry P.C.'s Motion for Joinder regarding: Administrative Class Counsel, filed Mar. 26, 2018..... JA8628

Dkt. 9816, Motion for Joinder by Locks Law Firm regarding: Hearing To Correct Fundamental Implementation Failures in Claims Processing, filed Mar. 26, 2018	JA8632
Dkt. 9819, Motion for Joinder by Provost Umphrey Law Firm, LLP regarding: Administrative Class Counsel, filed Mar. 27, 2018	JA8635
Dkt. 9820, Zimmerman Reed LLP's Joinder in Request for Action To Correct Implementation Failures in the Claims and BAP Administration, filed Mar. 27, 2018	JA8638
Dkt. 9821, Motion for Joinder by McCorvey Law, LLC regarding: Administrative Class Counsel, filed Mar. 27, 2018.....	JA8650
Dkt. 9824, Motion for Joinder by Lieff Cabraser Heinmann & Bernstein, LLP regarding: Hearing Request on Claims Settlement Process, filed Mar. 28, 2018	JA8654
Dkt. 9829, Motion for Joinder by Law Office of Hakimi & Shahriari regarding: Administrative Class Counsel, filed Mar. 28, 2018	JA8659
Dkt. 9830, Motion for Joinder by Casey Gerry regarding: Administrative Class Counsel, filed Mar. 28, 2018.....	JA8664
Dkt. 9831, Motion for Joinder by Podhurst Orseck regarding: Administrative Class Counsel, filed Mar. 29, 2018.....	JA8667
Dkt. 9833, Order regarding: Hearing as to Allocation, filed Mar. 28, 2018.....	JA8671
Dkt. 9834, Motion for Joinder by Mitnick Law Office regarding: Administrative Class Counsel, filed Mar. 29, 2018.....	JA8677
Dkt. 9835, Co-Lead Class Counsel's Letter regarding: Administrative Class Counsel, filed Mar. 29, 2018.....	JA8683
Dkt. 9836, Motion for Joinder by Wyatt Law regarding: Administrative Class Counsel, filed Mar. 29, 2018.....	JA8685
Dkt. 9837, Motion for Joinder by Robin Clouds LLP regarding: Administrative Class Counsel, filed Mar. 29, 2018.....	JA8688

Dkt. 9838, Notice by the Locks Law Firm In Response to Request for Deadline for Joinders and Date of Response Motion, filed Mar. 29, 2018.....	JA8690
Dkt. 9839, Motion for Joinder by Anapol Weiss regarding: Hearing Request on Claims Settlement Process, filed Mar. 29, 2018.....	JA8691
Dkt. 9840, Notice by the Locks Law Firm in Response to Request for Deadline for Joinders and Date of Response to Motion, filed Mar. 30, 2018.....	JA8694
Dkt. 9842, Motion for Joinder by Kreindler & Kreindler LLP regarding: Administrative Class Counsel, filed Mar. 30, 2018	JA8696
Dkt. 9843, Motion for Joinder by the Yerrid Law Firm and Neurocognitive Football Lawyers, filed Mar. 30, 2018	JA8700
Dkt. 9845, Order Directing Filing of Motions for Joinder, filed Apr. 2, 2018	JA8720
Dkt. 9847, Notice by Robins Cloud LLP of Withdrawal of Joinder regarding: Administrative Class Counsel, filed Apr. 2, 2018	JA8722
Dkt. 9848, Motion for Joinder by the Locks Law Firm to Anapol Weiss's Motion To Compel regarding: Reimbursement of Common Benefit Expenses and Establishment of Education Fund, filed Apr. 3, 2018	JA8724
Dkt. 9851, Notice by Lieff Cabraser Heinmann & Bernstein LLP of Withdrawal of Joinder regarding: Administrative Class Counsel, filed Apr. 3, 2018	JA8730
Dkt. 9852, Co-Lead Class Counsel's Response to Motion for Joinder Seeking Court Intervention, filed Apr. 3, 2018	JA8733
Dkt. 9853, Motion for Joinder by Hagen Rosskopf LLC regarding: Administrative Class Counsel, filed Apr. 3, 2018	JA8736
Dkt. 9854, Motion for Joinder by Smith Stallworth PA regarding: Administrative Class Counsel, filed Apr. 3, 2018	JA8741

Dkt. 9855, Motion for Joinder by Berkowitz and Hanna LLC regarding: Administrative Class Counsel and For a Hearing, filed Apr. 3, 2018	JA8743
Dkt. 9856, Motion for Joinder by Aldridge Objectors' regarding: Administrative Class Counsel, filed Apr. 3, 2018	JA8750
Dkt. 9856-1, Memorandum in Support of Movants' Joinder in the Motion of Class Counsel, the Locks Law Firm, for Appointment of Administrative Class Counsel.....	JA8752
Dkt. 9856-2, Exhibit A, Email correspondence dated Sept. 20, 2018	JA8761
Dkt. 9856-3, Exhibit B, Email correspondence dated Oct. 19, 2017	JA8762
Dkt. 9856-4, Exhibit C, Email correspondence dated Feb. 19, 2018	JA8764
Dkt. 9860, Memorandum of Hon. Anita Brody Granting Co-lead Counsel's Petition for Award of Attorneys' Fees and Reimbursement of Expenses, filed Apr. 5, 2018.....	JA8766
Dkt. 9862, Memorandum Opinion regarding: Attorneys' Fees, filed Apr. 5, 2018	JA8786
Dkt. 9865, Co-Lead Class Counsel's Response to Motion regarding: Cost Reimbursement, filed Apr. 5, 2018	JA8796
Dkt. 9870, Claims Administrator's Response to Locks Law Firm's Motion for Partial Joinder, filed Apr. 9, 2018	JA8802
Dkt. 9874, Co-Lead Class Counsel's Notice regarding: Class Counsel's Attorneys' Fee Award, filed Apr. 11, 2018	JA8837
Dkt. 9881, Co-Lead Class Counsel's Response to Locks Law Firm's Motion for Partial Joinder, filed Apr. 13, 2018	JA8839
Dkt. 9885, Co-Lead Class Counsel's Response in Opposition regarding: Administrative Class Counsel, filed Apr. 13, 2018	JA8847
Dkt. 9890, Order Denying the Motion of Class Counsel Locks Law Firm for Appointment of Administrative Class Counsel, filed Apr. 18, 2018	JA8884

Dkt. 9920, Tarricone Declaration regarding: Mar. 28, 2018 Order, filed May 1, 2018	JA8886
Dkt. 9921, Locks Law Firm's Motion for Reconsideration of the Denial of the Locks Law Firm's Motion for Appointment of Administrative Class Counsel, filed May 1, 2018	JA8891
Dkt. 9926, Aldridge Objectors' Motion for New Trial, filed May 2, 2018	JA8906
Dkt. 9955, Order Directing Firms Seeking Attorneys' Fees To File Materials, filed May 3, 2018.....	JA8908
Dkt. 9970, Amended Order for Hearing, filed May 7, 2018	JA8910
Dkt. 9985, Order Denying the Motion for Entry of Case Management Order Governing Applications for Attorneys' Fees; Cost Reimbursements; and Further Fee Set-Aside, filed May 14, 2018	JA8912
Dkt. 9990, Declaration by Mitnick Law Office regarding: Independent Fee Petition, filed May 14, 2018.....	JA8913
Dkt. 9993, Co-Lead Class Counsel's Response in Opposition regarding: Motion for Reconsideration of Administrative Class Counsel, filed May 15, 2018.....	JA8916
Dkt. 9995, Faneca Objectors' Statement regarding: Improvements to Preliminarily-Approved Settlement, filed May 16, 2018	JA8921
Dkt. 9996, Co-Lead Class Counsel's Response in Opposition regarding: Motion for New Trial, filed May 16, 2018	JA8925
Dkt. 10000, Co-Lead Class Counsel's PowerPoint from May 15, 2018 Hearing, filed May 17, 2018	JA8939
Dkt. 10001, Anapol Weiss's Motion for Leave To File Supplemental Memorandum regarding: Allocation of Common Benefit Fees, filed May 17, 2018	JA8954
Dkt. 10004, Order regarding: Hearing Concerning Attorneys' Fees, filed May 21, 2018	JA8961

Dkt. 10007, Order Denying Anapol Weiss' Motion for Leave To File Supplemental Memorandum regarding: Allocation of Common Benefit Fees, filed May 21, 2018.....	JA8963
Dkt. 10016, Letter Brief by the Locks Law Firm, filed May 22, 2018	JA8964
Dkt. 10017, Co-Lead Class Counsel's Response regarding: Locks Law Firm's Letter Brief, filed May 23, 2018	JA8968
Dkt. 10019, Explanation and Order of Judge Brody re Allocation of Attorneys' Fees, filed May 24, 2018	JA8971
Dkt. 10022, Aldridge Objectors' Motion To Stay regarding: Attorneys' Fees Allocation, filed May 25, 2018	JA8998
Dkt. 10023, Order Finding as Moot Motion To Strike Class Counsel's Sur-Reply regarding: Fee Allocation, filed May 29, 2018	JA9000
Dkt. 10026, Co-Lead Class Counsel's Response regarding: Mitnick Law Office's Petition for Independent Award of Attorneys' Fees, filed May 29, 2018	JA9001
Dkt. 10031, Co-Lead Class Counsel's Response in Opposition regarding: Aldridge Objectors' Motion To Stay, filed May 31, 2018.....	JA9004
Dkt. 10039, Aldridge Objectors' Reply to Response to Motion regarding: Motion To Stay, filed June 1, 2018	JA9015
Dkt. 10073, The Locks Law Firm's Motion for Reconsideration of the Court's Explanation and Order, filed June 7, 2018	JA9025
Dkt. 10085, Order Denying as Moot the Aldridge Objectors' Motion To Reconsider Withdrawal of Fed. R. Evid. 706 Deposition, filed June 19, 2018	JA9034
Dkt. 10086, Order Denying as Moot the Motion Requesting the Court To Direct the Relevant Parties To Negotiate on the Allocations of the Common Benefit Fund, filed June 19, 2018.....	JA9035
Dkt. 10091, Co-Lead Class Counsel's Response in Opposition regarding: the Locks Law Firm's Motion for Reconsideration, filed June 19, 2018	JA9036

Dkt. 10096, Faneca Objectors' Notice of Filing Hearing Slides, filed June 22, 2018	JA9042
Dkt. 10105, Certified Copy of Order from the USCA, filed June 28, 2018	JA9048
Dkt. 10119, Order Denying Motion for Reconsideration of the Denial of Locks Law Firm's Motion for Appointment of Administrative Class Counsel, filed July 2, 2018	JA9049
Dkt. 10127, Order Denying Motion for Reconsideration of the Court's Explanation and Order ECF Nos. 10072 and 10073, filed July 10, 2018	JA9051
Dkt. 10128, First Verified Petition of Co-Lead Class Counsel Christopher A. Seeger for an Award of Post-Effective Date Common Benefit Attorneys' Fees and Costs, filed July 10, 2018	JA9052
Dkt. 10134, Transcript of May 15, 2018 Hearing, filed July 13, 2018	JA9073
Dkt. 10145, Status Report of Co-Lead Class Counsel, filed July 18, 2018	JA9198
Dkt. 10165, Aldridge Objectors' Objections regarding: Post-Effective Date Fees, filed July 24, 2018	JA9205
Dkt. 10165-1, Exhibit 1, Declaration of Christopher A. Seeger	JA9221
Dkt. 10165-2, Exhibit 2, Letter from Craig R. Mitnick to Judge Brody dated Apr. 16, 2018	JA9224
Dkt. 10165-3, Text of Proposed Order	JA9229
Dkt. 10188, Notice of Appeal of Locks Law Firm from the May 24, 2108 Explanation and Order ECF No. 10019, filed August 2, 2018	JA9230
Dkt. 10261, Zimmerman Reed LLP's Objection regarding: Post- Effective Date Fees, filed Sept. 18, 2018	JA9233
Dkt. 10278, Declaration of Christopher A. Seeger regarding: Post- Effective Date Fees, filed Sept. 27, 2018	JA9242

Dkt. 10283, Order Adopting Amended Rules Governing Attorneys' Liens, filed Oct. 3, 2018	JA9248
Dkt. 10294, Order Adopting Amended Rules Governing Petitions for Deviation from the Fee Cap, filed Oct. 10, 2018.....	JA9272
Dkt. 10368, Report and Recommendation of Magistrate Judge Strawbridge, filed January 7, 2109	JA9290
Dkt. 10374, Second Verified Petition of Co-Lead Class Counsel Seeger for Award of Post-Effective Date Common Benefit Attorneys Fees and Costs, filed January 10, 2109	JA9383
Dkt. 10624, Order regarding: Vacating appointments of all Class Counsel, Co-Lead Class Counsel, and Subclass Counsel and Reappointing Christopher A. Seeger as Class Counsel, filed May, 24, 2019	JA9402
Dkt. 10677, Report and Recommendation of Magistrate Strawbridge, filed June 20, 2109	JA9404
Dkt. 10756-1, David Buckley, PLLC, Mokaram Law Firm and Stern Law Group's Petition to Establish Attorney's Lien, filed July 18, 2019	JA9425
Dkt. 10767, Third Verified Petition of Class Counsel Seeger for Award of Post-Effective Date Common Benefit Attorneys Fees and Costs, filed July 25, 2109	JA9428

**UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA**

IN RE: NATIONAL FOOTBALL
LEAGUE PLAYERS' CONCUSSION
INJURY LITIGATION

No. 2:12-md-02323-AB
MDL No. 2323

Kevin Turner and Shawn Wooden,
*on behalf of themselves and
others similarly situated,*

Civil Action No. 2:14-cv-00029-AB

Plaintiffs,

v.

National Football League and
NFL Properties, LLC,
successor-in-interest to
NFL Properties, Inc.,

Defendants.

THIS DOCUMENT RELATES TO:
ALL ACTIONS

**POST-FAIRNESS HEARING SUPPLEMENTAL BRIEFING OF OBJECTORS
SEAN MOREY, ALAN FANECA, BEN HAMILTON, ROBERT ROYAL,
RODERICK CARTWRIGHT, JEFF ROHRER,
AND SEAN CONSIDINE**

TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	1
ARGUMENT	2
I. Class Counsel and the NFL Have Not Refuted the Showing that the Settlement Is Unfair in Its Failure To Compensate the Vast Majority of Class Members for CTE While Extracting a Release for All CTE Claims	2
A. Class Counsel and the NFL Have Not – and Cannot – Overcome the Basic Medical Science Regarding CTE.....	4
1. Dr. Stern and Dr. Gandy Have Credibly Established the Need To Compensate CTE	4
2. The Basic Medical Science Set Forth by Dr. Stern and Dr. Gandy Is Widely Accepted by the Medical Community.....	6
3. The Experts Hired by the NFL and Class Counsel Acknowledge the Experience and Knowledge of Dr. Stern and Dr. Gandy.....	8
4. The Experts Hired by the NFL and Class Counsel Are Biased	9
5. The Tortured “Analysis” of the Experts Hired by the NFL and Class Counsel Fails To Refute the Accepted Medical Science Concerning CTE	11
a. Existing CTE Research Demonstrates Causation	11
b. CTE Presents with Severe and Debilitating Mood and Behavioral Symptoms.....	14
6. The Opinions Expressed in the Declarations of the Experts Hired by the NFL and Class Counsel – Which They Offer To Support the Settlement – Are Inconsistent Internally and With the Opinions They Have Expressed Before They Were Retained by the NFL and Class Counsel	16
7. The Science Surrounding CTE Should Not Be Frozen by the Settlement	17
B. Compensating “Dementia” Does Not Equal Compensating CTE	18

II.	The Failure To Credit NFL Europe Play and the Application of the 75% Non-NFL Traumatic Brain Injury Offsets Render the Settlement Unfair.....	20
III.	The Class Conflicts Caused by the Settlement's Treatment of CTE, NFL Europe Play, and Non-NFL Traumatic Brain Injuries and Strokes Demonstrate a Lack of Adequate Representation in Violation of Federal Rule of Civil Procedure 23(a)(4)	21
IV.	Procedural Hurdles Will Prevent Many Class Members from Ever Recovering	22
V.	Class Notice Has Caused Confusion Among the Class	24
VI.	The Public Interest and Public Opinion Disfavor Final Approval.....	25
VII.	The Settlement Does Not Guarantee That Funds Will Be Available To Pay Claims During the Full Term of the Settlement.....	29
VIII.	Potential Improvements to the Settlement	30
	CONCLUSION.....	31

TABLE OF AUTHORITIES

	<u>Page(s)</u>
CASES	
<i>Amchem Prods., Inc. v. Windsor</i> , 521 U.S. 591 (1997).....	17, 18
<i>Berkeley Inv. Grp., Ltd. v. Colkitt</i> , 455 F.3d 195 (3d Cir. 2006)	3
<i>Cary Oil Co. v. MG Ref. & Mktg., Inc.</i> , 257 F. Supp. 2d 751 (S.D.N.Y. 2003).....	10
<i>In re Cendant Corp. Litig.</i> , 264 F.3d 201 (3d Cir. 2001).....	1
<i>Dewey v. Volkswagen Aktiengesellschaft</i> , 681 F.3d 170 (3d Cir. 2012)	21
<i>Ehrheart v. Verizon Wireless</i> , 609 F.3d 590 (3d Cir. 2010)	2
<i>Eubank v. Pella Corp.</i> , 753 F.3d 718 (7th Cir. 2014).....	24
<i>Falise v. Am. Tobacco Co.</i> , 94 F. Supp. 2d 316 (E.D.N.Y. 2000).....	11
<i>In re Gen. Motors Corp. Pick-Up Truck Fuel Tank Litig.</i> , 55 F.3d 768 (3d Cir. 1995).....	2, 25
<i>Georgine v. Amchem Prods., Inc.</i> , 83 F.3d 610 (3d Cir. 1996)	17, 18
<i>Ortiz v. Fibreboard Corp.</i> , 527 U.S. 815 (1999)	17, 18
<i>Pearson v. NBTY, Inc.</i> , No. 12-1245, 2014 WL 6466128 (7th Cir. Nov. 19, 2014).....	24
<i>Robertson v. Allied Signal, Inc.</i> , 914 F.3d 360 (3d Cir. 1990)	13
<i>Staub v. Proctor Hosp.</i> , 131 S. Ct. 1186 (2011)	13
STATUTES AND RULES	
Fed. R. Civ. P. 23.....	2, 30
Fed. R. Civ. P. 23(a)(4).....	1, 21, 22
OTHER AUTHORITIES	
Associated Press, <i>Ex-Steelers Long Drank Antifreeze To Commit Suicide</i> , ESPN (Jan. 26, 2006), http://sports.espn.go.com/nfl/news/story?id=230700	15
Brandeis, <i>Other People's Money</i> (National Home Library Foundation ed. 1933).....	29

Carman, et al., "Mind the Gaps": Advancing Research in Short- and Long-Term Neuropsychological Outcomes of Youth Sports-Related Concussions, Submitted, <i>Nature Reviews Neurology</i> (2014).....	8
Carroll, <i>Could Brain Injuries Be Behind the NFL Rap Sheet?</i> , NBC News (Sept. 17, 2014), http://www.nbcnews.com/storyline/nfl-controversy/could-brain-injuries-be-behind-nfl-rap-sheet-n205666	16, 17
Crary, et al., Primary Age-Related Tauopathy (PART): A Common Pathology Associated with Human Aging, 128 <i>Acta Neuropathologica</i> 755 (2014)	8
Dall, et al., Supply and Demand Analysis of the Current and Future US Neurology Workforce, 81 <i>Neurology</i> 470 (2013)	22
Dao, <i>Brain Ailments in Veterans Likened to Those in Athletes</i> , N.Y. Times (May 16, 2012), http://www.nytimes.com/2012/05/17/us/brain-disease-is-found-in-veterans-exposed-to-bombs.html?pagewanted=all&_r=0	16
Daugherty, <i>Settlement II: Concussion Cases Become a Headache for NFL</i> , San Diego Reader (July 9, 2014), http://www.sandiegoreader.com/news/2014/jul/09/sporting-settlement-II	26
DeGory, <i>New Concussion Settlement a Win-Win</i> , SportsIllustrated.com (June 26, 2014), http://mmqb.si.com/2014/06/26/new-concussion-settlement-kevin-turner	25
Delsohn, <i>OTL: Belcher's Brain Had CTE Signs</i> , ESPN (Sept. 30, 2014), http://espn.go.com/espn/otl/story/_/id/11612386/jovan-belcher-brain-showed-signs-cte-doctor-says-report	15
Erichson, <i>The NFL Concussion Settlement: Class Action Exploitation</i> , Mass Tort Litigation Blog (Nov. 18, 2014), http://lawprofessors.typepad.com/mass_tort_litigation/2014/11/the-nfl-concussion-settlement-and-class-action-exploitation.html	26
Fainaru & Fainaru-Wada, <i>Lawyers Fight Over Settlement Details</i> , ESPN.com (Jan. 24, 2014), http://espn.go.com/espn/otl/story/_/id/10346091/lead-negotiator-facing-strong-opposition-concussion-settlement	27
Federal Judicial Center, <i>Reference Manual on Scientific Evidence</i> (3d ed. 2011)	13, 14
Hruby, <i>The NFL Concussion Settlement Is Pure Evil</i> , Vice Sports (Oct. 28, 2014), https://sports.vice.com/article/the-nfl-concussion-settlement-is-pure-evil	26
Hruby, <i>The NFL Dodges on Brain Injuries</i> , The Atlantic (Sept. 4, 2014), http://www.theatlantic.com/entertainment/archive/2014/09/the-nfls-concussion-settlement-not-acceptable/379557	26

Iverson, <i>Advances and Controversies in Neuropsychological Assessment: 7-Year Funding Disclosure</i> , http://www.sgtv.org/download/271113_iverson_advances_controversies_in_np_assessment.pdf	11
Kaplen & De Caro, <i>Op-Ed: Concussion Settlement Is Deeply Flawed</i> , National Law Journal (July 21, 2014), http://www.nationallawjournal.com/id=1202663714809/OpEd-Concussion-Settlement-Is-Deeply-Flawed	26
Keating, <i>NFL's Concussions Expert Also Sells Equipment to League</i> , ESPN The Magazine (Aug. 10, 2007), http://sports.espn.go.com/nfl/news/story?id=2967678	10
Leavy, <i>The Woman Who Would Save Football</i> , Grantland (Aug. 17, 2012), http://grantland.com/features/neuropathologist-dr-ann-mckee-accused-killing-football-be-sport-only-hope/	9
<i>Manual for Complex Litigation</i> § 21.61 (4th ed.)	3
McDonald, <i>Study Finds a Strong Correlation Between Repeated Head Trauma and Domestic Abuse</i> , The Washington Post (Oct. 22, 2014)	15
McKee, et al., <i>The Spectrum of Disease in Chronic Traumatic Encephalopathy</i> , 136 Brain 43 (2013)	9, 12, 15, 20
1 <i>McLaughlin on Class Actions</i> § 4:30 (11th ed.)	17
Naj, et al., <i>Common Variants at MS4A4/MS4A6E, CD2AP, CD33 and EPHA1 Are Associated with Late-Onset Alzheimer's Disease</i> , 43 Nature Genetics 436 (2011)	8
Naj, et al., <i>Effects of Multiple Genetic Loci on Age at Onset in Late-Onset Alzheimer Disease: A Genome-Wide Association Study</i> , 71 J.A.M.A. Neurology 1394 (2014)	8
Nelson, et al., <i>Correlation of Alzheimer Disease Neuropathologic Changes with Cognitive Status: A Review of the Literature</i> , 71 J. Neuropathology & Experimental Neurology 362 (2012)	8
NFL Concussion Class Settlement (May 1, 2014), https://www.youtube.com/watch?v=9EWNBNGMoEk	25
Pearson & Feeley, <i>NFL Critics Say Concussion Accord Ignores Broken Lives</i> , Bloomberg (Nov. 19, 2014), http://www.bloomberg.com/news/2014-11-19/nfl-settlement-objectors-seek-to-sway-judge-from-approval.html	26

Reed, <i>Time's Running Out To Stop Bad NFL Concussion Settlement</i> , League of Fans (Nov. 14, 2014), http://leagueoffans.org/2014/11/14/times-running-out-to-stop-bad-nfl-concussion-settlement	26
<i>Restatement (Third) of Torts: Phys. & Emot. Harm</i> § 36 (2010)	13, 15
Sandomir, <i>Partly by Shunning Documentary, ESPN Lifts It</i> , N.Y. Times (Oct. 9, 2013), http://www.nytimes.com/2013/10/10/sports/football/by-shunning-concussion-documentary-espn-gives-it-a-lift.html	26
Schwarz, <i>Expert Ties Ex-Player's Suicide to Brain Damage</i> , N.Y. Times (Jan. 18, 2007), http://www.nytimes.com/2007/01/18/sports/football/18waters.html?pagewanted=all	15
Smith, <i>Ex-Falcons Lineman Had Brain Disease Linked to Concussions</i> , CNN Health (Apr. 1, 2011), http://www.cnn.com/2011/HEALTH/04/01/brain.concussion.dronett/index.html?hpt=Sbin	15
Smith, <i>Lives After Junior</i> , ESPN (May 2, 2013) http://espn.go.com/nfl/story/_/id/9410051/a-year-later-one-junior-seau-close-friends-comes-forward-recount-version-descent	15
Solotaroff, <i>Dave Duerson: The Ferocious Life and Tragic Death of a Super Bowl Star</i> , Men's Journal (May 2011), http://www.mensjournal.com/magazine/dave-duerson-the-ferocious-life-and-tragic-death-of-a-super-bowl-star-2012100	15
Sun, <i>NY Giants' Steve Tisch Reveals His \$10M Plan To Further Concussion Research</i> , Hollywood Reporter (Sept. 11, 2014), http://www.hollywoodreporter.com/news/ny-giants-steve-tisch-reveals-731376	10
Van Deerlin, et al., <i>Common Variants at 7p21 Are Associated With Frontotemporal Lobar Degeneration with TDP-43 Inclusions</i> , 42 Nature Genetics 234 (2010).....	8
Wertheimer, <i>The Smoke Gets in Their Eyes: Product Category Liability and Alternative Feasible Designs in the Third Restatement</i> , 61 Tenn. L. Rev. 1429 (1994).....	3
Weiner, et al., <i>Military Risk Factors for Alzheimer's Disease</i> , 9 Alzheimer's & Dementia 445 (2013).	8, 16

INTRODUCTION

The settling parties have fallen woefully short of meeting their burden of demonstrating that the Settlement is fair, adequate, and reasonable. *See In re Cendant Corp. Litig.*, 264 F.3d 201, 232 (3d Cir. 2001). Most fundamentally, the Settlement is neither fair nor adequate because it fails to compensate the vast majority of the class for CTE – “the most serious and harmful disease that results from NFL and concussions”¹ – while specifically releasing all claims for CTE. The failure to credit seasons played in NFL Europe and the imposition of extraordinary offsets for non-NFL traumatic brain injuries and strokes also render the Settlement unfair. Independently, the Settlement should not be approved because conflicts within the class demonstrate a lack of adequate representation in violation of Federal Rule of Civil Procedure 23(a)(4); the process for receiving benefits is overly burdensome and inadequate; and the notice was deficient. The end result is that absent class members are being deprived of their property rights – claims carefully researched and aggressively asserted by Class Counsel claiming to be “the best of the best” – without due process.

¹ Co-Lead Class Counsel Seeger Weiss used to have on its website a tutorial relating to MTBI and football:

Frequent brain trauma or multiple football concussions . . . has [been] shown to cause serious mental health problems. ***Thousands of football players, many of whom are thought to have suffered more than one hundred mild traumatic brain injuries, are dealing with horrible and debilitating symptoms.***

Multiple medical studies have found direct correlation between football concussions and suffering from symptoms of chronic traumatic encephalopathy, also known as CTE. ***CTE is believed to be the most serious and harmful disease that results from NFL and concussions.*** CTE is a progressive degenerative disease that causes damage to the brain tissue and the accumulation of Tau Proteins.

Up-To-Date Information on NFL Concussions, Seeger Weiss LLP, (Sept. 9, 2014), <http://www.seegerweiss.com/football-concussions/#ixzz3CByVHxui> (emphasis added) (Objection 2 n.1 & Ex. 1). Seeger Weiss removed that language after oral argument in the Third Circuit on September 10, 2014, at which the inadequate representation and failure to compensate CTE, as well as this language on the website, was raised.

The NFL and Class Counsel have repeatedly offered the ability of class members to opt out as a justification for the Settlement itself.² But the issue is not whether a settlement includes the ability to opt out. The issue is whether absent class members were presented with a fair settlement, compliant with Rule 23 and due process. As the Third Circuit has stated, “the right of parties to opt out does not relieve the court of its duty to safeguard the interests of the class” and ensure that the settlement is fair. *In re Gen. Motors Corp. Pick-Up Truck Fuel Tank Prods. Litig.*, 55 F.3d 768, 809 (3d Cir. 1995). Class members should not be presented with a false choice – one between an inadequate settlement and the burdens of litigating complex claims alone. They are instead entitled to a fair settlement.

Both Class Counsel and the NFL sloughed off serious concerns raised at the fairness hearing, in some instances attempting to mock them. Indeed, Class Counsel’s rebuttal argument regrettably degenerated to attacking the messenger given that he could not attack Objectors’ message.

To be absolutely clear, Objectors want to see a settlement. However, the law requires that settlement to be fair, adequate, and reasonable. As structured, this Settlement fails that test.

ARGUMENT

I. Class Counsel and the NFL Have Not Refuted the Showing that the Settlement Is Unfair in Its Failure To Compensate the Vast Majority of Class Members for CTE While Extracting a Release for All CTE Claims

Final approval should be denied where “the settlement treats ‘similarly situated class members differently’” or “the settlement releases ‘claims of parties who received no compensation in the settlement.’” *Ehrheart v. Verizon Wireless*, 609 F.3d 590, 604 (3d Cir.

² See, e.g., Fairness Hearing Tr. 56-57 (NFL counsel stating that class members were “free to opt out of the settlement”); NFL Br. 73 (Dkt. No. 6422) (“the Settlement . . . provides a choice—the right to opt out”); Klonoff Decl. ¶ 121 (Dkt. No. 6423-9) (“Finally, as I have noted throughout this declaration, class members who found the settlement inadequate had a right to opt out.”).

2010) (quoting *Manual for Complex Litigation* § 21.61 (4th ed.)). This Settlement does both by providing up to \$4 million for death with CTE before July 7, 2014, but nothing for death with CTE after that date, and nothing to treat the very serious symptoms – including suicidality – of CTE in the living.

By including an award of up to \$4 million for death with CTE before July 7, 2014, Class Counsel and the NFL have acknowledged that CTE is a real disease, linked to playing in the NFL. Class Counsel, and the cadre of experienced plaintiffs' lawyers they lead, argued vigorously for this when – after this litigation had been pending for more than two years with hundreds of individual suits filed – they alleged that CTE is an injury suffered by the class that is caused by playing in the NFL. *See Turner v. Nat'l Football League*, Civ. A. No. 2:14-cv-29-AB, Dkt. No. 1 ¶¶ 2, 252, 260, 312, 346, 364 (E.D. Pa. Jan. 6, 2014) (“Class Action Complaint”); *see also id.* ¶ 235 (“[T]he evidence that CTE is caused by repeated sublethal brain trauma is overwhelming.”).³ The backpedaling they have done since being challenged on the Settlement’s gross deficiency cannot avoid the judicially admitted stance they have previously taken. *See Berkeley Inv. Grp., Ltd. v. Colkitt*, 455 F.3d 195, 211 n.20 (3d Cir. 2006) (“Judicial admissions are concessions in pleadings or briefs that bind the party who makes them.”).

Nor can Class Counsel and the NFL avoid the science. Their use of bought-and-paid-for experts in an attempt to cobble together an alternative medical and scientific reality is reminiscent of the tobacco companies claiming that lung cancer was not linked to smoking cigarettes.⁴ It ignores the truth.

³ Co-Lead Class Counsel stated at the fairness hearing that they “have tried numerous bellwether cases,” negotiated settlements for “many billions of dollars,” and have consulted with numerous experts in this case. Fairness Hearing Tr. 25, 33.

⁴ See, e.g., Wertheimer, *The Smoke Gets in Their Eyes: Product Category Liability and Alternative Feasible Designs in the Third Restatement*, 61 Tenn. L. Rev. 1429, 1452-53 (1994)

The entire class is entitled to some form of fair compensation for CTE – or CTE should be dropped from the release.

A. Class Counsel and the NFL Have Not – and Cannot – Overcome the Basic Medical Science Regarding CTE

1. Dr. Stern and Dr. Gandy Have Credibly Established the Need To Compensate CTE

Objectors submitted declarations from two of the world's leading experts on CTE – Dr. Robert Stern, Professor of Neurology, Neurosurgery, and Anatomy & Neurobiology at Boston University School of Medicine, and Dr. Samuel Gandy, Professor of Alzheimer's Disease Research and Professor of Neurology and Psychiatry at Mt. Sinai School of Medicine in New York City. *See* Stern Decl. ¶ 1 (Dkt. No. 6201-16); Gandy Decl. ¶ 1 (Dkt. No. 6232-1). Drs. Stern and Gandy submitted their declarations without compensation because they so strongly believe that the Settlement is unfair. Each of them, in his initial declaration, clearly explained why CTE is central to this case and why refusing to compensate the vast majority of the class for CTE would be unfair.

Dr. Stern has “published (as first or second author) the largest case series of the clinical presentation of neuropathologically-confirmed CTE.” Stern Decl. ¶ 24. He is a Fellow of the American Neuropsychiatric Association and the National Academy of Neuropsychology. *Id.* ¶ 5. He sits on the editorial boards of several leading medical and scientific journals and on the grant review committees of several funding agencies, including the National Institutes of Health. *Id.*

As Dr. Stern explained, the “primary clinical features of CTE include impaired cognition, mood, and behavior.” Stern Decl. ¶ 31. These “behavioral and mood disorders associated with head impacts in former professional football players are just as important, just as serious, and

(“[T]here is evidence that the cigarette industry as a whole has worked long and hard to conceal the true extent of the dangers of smoking.”).

just as amenable to detection and diagnosis, as cognitive disorders.” *Id.* ¶ 32; *see also id.* ¶ 33 (“Individuals with impairments in mood and behavior, but without significant cognitive impairment can still experience devastating changes in their lives.”). Mood and behavioral changes affect not only the individual with CTE but also the individual’s “family, friends, and other loved ones.” *Id.* ¶ 34. CTE can also lead to cognitive disorders. *Id.* ¶ 41. Although Dr. Stern acknowledged that there is not currently a test to diagnose CTE in the living with 100% accuracy, he has stated that “within the next five to ten years there will be highly accurate, clinically accepted, and FDA-approved methods to diagnose CTE during life.” *Id.* ¶ 38.

Dr. Gandy has explained that, “[p]athologically, CTE involves build-up of phosphorylated tau protein in the brain.” Gandy Decl. ¶ 4. CTE is “the only neurodegenerative disease that has been linked to a specific acquired cause – repeated head trauma.” *Id.* Consistent with Dr. Stern, Dr. Gandy has stated that “[i]ndividuals with neuropathologically confirmed CTE have significant problems with mood, behavior, and/or movement and not just problems with cognition.” *Id.* ¶ 5. In his declaration, Dr. Gandy also explained that, “[b]ecause CTE symptoms present much earlier than the symptoms of other neurodegenerative diseases, individuals with CTE face decades of disability, a challenge that others afflicted with neurodegenerative disease do not face.” *Id.* ¶ 7. Although some form of dementia “is evident in most individuals with CTE who survive to age 65,” *id.* ¶ 8, “[t]he high rates of suicides, accidents, and drug overdoses” in individuals with CTE “often lead to death before the individual reaches age 65,” *id.* ¶ 9.

Class Counsel attacked Dr. Stern and Dr. Gandy at the fairness hearing by distorting their work. To avoid the misimpression Class Counsel attempted to create, and to clarify matters for the Court, Dr. Stern and Dr. Gandy have submitted supplemental declarations (again without receiving any compensation).

In his supplemental declaration, Dr. Stern explains that CTE is a unique degenerative disease described in leading neurology textbooks. Stern Supp. Decl. ¶ 4. He reaffirms that there will be a test to diagnose CTE in the living long before the Settlement term concludes. *Id.* ¶ 13. He also states that CTE research will continue into the future as it continues to receive funding from various organizations. *Id.* ¶¶ 11-13.

In his supplemental declaration, Dr. Gandy states that “neuropathological diagnosis of CTE is currently available and is widely accepted and recognized in the medical and scientific community as a valid diagnosis.” Gandy Supp. Decl. ¶ 8. He also notes that “[i]t is only a matter of time” before there will be “a reliable clinical diagnosis of CTE in the living.” *Id.* ¶ 9. Dr. Gandy also explains that “[r]epetitive brain trauma is a necessary condition for developing CTE; in the absence of repetitive brain trauma, an individual will not develop CTE.” *Id.* ¶ 12. “[I]n nearly 200 cases of neuropathologically confirmed CTE,” Dr. Gandy states, “*every case* has occurred in an individual who experienced repetitive brain trauma.” *Id.*

2. The Basic Medical Science Set Forth by Dr. Stern and Dr. Gandy Is Widely Accepted by the Medical Community

The fundamental points Dr. Stern and Dr. Gandy have made about CTE are in no way extreme or aggressive. Nine of the most prominent individuals working in the field of neuroscience have corroborated them through declarations they have submitted in support of Objectors – *all without compensation* for their time and effort.

These experts are:

- Dr. Patrick Hof, Regenstreif Professor of Neuroscience and Vice-Chair in the Department of Neuroscience at the Icahn School of Medicine at Mount Sinai in New York
- Dr. Jing Zhang, Professor of Pathology at the University of Washington and Chief of Neuropathology Services

- Dr. Martha Shenton, Professor of Psychology and Radiology, Brigham and Women's Hospital and Harvard Medical School
- Dr. Charles Bernick, Associate Director, Cleveland Clinic Lou Ruvo Center for Brain Health
- Dr. Michael Weiner, Professor in Radiology and Biomedical Engineering, Medicine, Psychiatry, and Neurology at the University of California, San Francisco
- Dr. James Stone, Associate Professor of Radiology and Medical Imaging and of Neurological Surgery at the University of Virginia; Co-Director of the University of Virginia Brain Injury and Sports Concussion Institute
- Dr. Thomas Wisniewski, Professor of Neurology, Pathology, and Psychiatry at NYU's School of Medicine
- Dr. Steven DeKosky, Visiting Professor of Radiology and Neurology at the University of Pittsburgh School of Medicine; Immediate Past Dean and Emeritus Professor of Neurology at the University of Virginia School of Medicine
- Dr. Wayne Gordon, Jack Nash Professor and Vice Chair of the Department of Rehabilitation Medicine at the Icahn School of Medicine at Mount Sinai in New York

These world-class experts make the following points in his or her declarations:

1. CTE is a unique neurodegenerative disease that is known to exist outside of ALS, Alzheimer's disease, or Parkinson's disease.
2. Repetitive brain trauma is a necessary condition for developing CTE.
3. ALS, Alzheimer's disease, and Parkinson's disease are found in the general population of individuals who have not suffered repetitive brain trauma. Suicidality does not present as a symptom of these diseases.
4. Mood and behavioral impairments such as depression, suicidality, hopelessness, impulsivity, explosiveness, rage, and aggression, although present in the general population, appear more frequently in individuals suffering from CTE than in the general population.
5. The mood and behavioral impairments associated with CTE can present prior to the onset of CTE-related dementia and can be the cause of significant disability and distress for the patient.

6. A reliable, valid, and clinically accepted diagnosis of CTE in the living, based, in part, on objective biomarkers, will likely be possible in the next decade, if not sooner, and long before the 65-year term of the proposed Settlement expires.
7. Although the Settlement uses the terms “Neurocognitive Impairment Level 1.0,” “Neurocognitive Impairment Level 1.5,” and “Neurocognitive Impairment Level 2.0,” those terms are not used as diagnostic or classification categories in the accepted medical and scientific community.

The declarations are being included as attachments to this supplemental brief.

3. The Experts Hired by the NFL and Class Counsel Acknowledge the Experience and Knowledge of Dr. Stern and Dr. Gandy

Although Class Counsel and the NFL seek to discredit Drs. Stern and Gandy (as well as Dr. Ann McKee), their own experts disagree. The settling parties’ experts have coauthored numerous academic papers with all three doctors.⁵ And they acknowledge the groundbreaking work that Drs. Stern, Gandy, and McKee are conducting in the field of CTE research. Dr. Schneider and Dr. Yaffe both agree, for example, that “Dr. Stern’s research, which is conducted with other doctors at Boston University, including Dr. Ann McKee, constitutes important research in the field of CTE at this time.” Schneider Decl. ¶ 30 (Dkt. No. 6422-35); Yaffe Decl.

⁵ See Carman, et al., “Mind the Gaps”: Advancing Research in Short- and Long-Term Neuropsychological Outcomes of Youth Sports-Related Concussions, Submitted, Nature Review Neurology (2014) (co-authors include Christopher Giza and Dr. Gandy); Crary, et al., Primary Age-Related Tauopathy (PART): A Common Pathology Associated with Human Aging, 128 Acta Neuropathologica 755 (2014) (co-authors include Julie Schneider and Dr. McKee); Naj, et al., Effects of Multiple Genetic Loci on Age at Onset in Late-Onset Alzheimer Disease: A Genome-Wide Association Study, 71 J.A.M.A. Neurology 1394 (2014) (co-authors include Julie Schneider, Dr. Stern, and Dr. McKee); Nelson, et al., Correlation of Alzheimer Disease Neuropathologic Changes with Cognitive Status: A Review of the Literature, 71 J. Neuropathology & Experimental Neurology 362 (2012) (co-authors include Julie Schneider and Dr. McKee); Naj, et al., Common Variants at MS4A4/MS4A6E, CD2AP, CD33 and EPHA1 Are Associated with Late-Onset Alzheimer’s Disease, 43 Nature Genetics 436 (2011) (co-authors include Julie Schneider, Dr. Stern, and Dr. McKee); Van Deerlin, et al., Common Variants at 7p21 Are Associated With Frontotemporal Lobar Degeneration with TDP-43 Inclusions, 42 Nature Genetics 234 (2010) (co-authors include Julie Schneider and Dr. McKee); Weiner, et al., Military Risk Factors for Alzheimer’s Disease, 9 Alzheimer’s & Dementia 445 (2013) (co-authors include Kristine Yaffe and Dr. McKee).

¶ 69 (Dkt. No. 6422-36) (same quote). Dr. Yaffe further explains that “[s]tudies such as [Ann McKee, Robert Stern, *et al.*, *The Spectrum of Disease in Chronic Traumatic Encephalopathy*, 136 Brain 43 (2013) (“McKee *et al.* 2013”)] should be lauded and praised for pioneering the science of CTE.” Yaffe Decl. ¶ 71. Citing the McKee study that Objectors rely on, moreover, Dr. Fischer addresses the four stages of CTE without ever suggesting that those stages are not legitimate ways of tracking the progression of CTE. Fischer Decl. ¶ 12 (Dkt. No. 6423-17); *see also* Hamilton Decl. ¶ 26 (Dkt. No. 6423-25); Nitz Supp. Decl. Ex. 1. And in an article in the New York Times, “[Dr.] Hovda, whose research into the neurobiology of concussions demonstrated the vulnerability of the brain to second insults, says McKee’s science is rigorous, significant, and does not overinterpret the available data.”⁶ Rather than criticize the research conducted by Drs. Stern, Gandy, and McKee, the settling parties’ experts embrace and rely upon it.

4. The Experts Hired by the NFL and Class Counsel Are Biased

Dr. Stern and Dr. Gandy – and now the nine other preeminent experts that join in the fundamental points of their analysis – so strongly believe that the Settlement is a bad deal for players that they have provided their services to the Court and the class for free. Though Class Counsel mocked this fact during the fairness hearing, *see* Fairness Hearing Tr. 196, the impartiality of expert testimony, and of the scientific studies that inform that testimony, is critical in a case such as this one. As Class Counsel has expressly alleged, the NFL “propagated its own industry-funded and falsified research to support its position.” Class Action Complaint ¶ 84.

Neither the NFL nor Class Counsel, however, have disclosed the amount of compensation they paid to their experts or their experts’ employers. That omission – in stark

⁶ Leavy, *The Woman Who Would Save Football*, Grantland (Aug. 17, 2012), <http://grantland.com/features/neuropathologist-dr-ann-mckee-accused-killing-football-be-sport-only-hope/> (attached as Nitz Supp. Decl. Ex. 2).

contrast to Objectors' unqualified, unambiguous statement that none of their experts received any compensation whatsoever for their declarations – provides an appropriate baseline for this Court to view the credibility of the various expert declarations. *See Cary Oil Co. v. MG Ref. & Mktg., Inc.*, 257 F. Supp. 2d 751, 756 (S.D.N.Y. 2003) (citing cases holding that experts may be cross-examined on their compensation "in an effort to impeach for bias").

Even apart from compensation for their declarations, the settling parties' experts have conflicts of interest that, at a minimum, call into question the value of their declarations. For example, Class Counsel and the NFL never disclosed that the UCLA lab that employs Class Counsel experts Giza and Hovda received a \$10 million donation from Steve Tisch, the co-owner of the New York Giants.⁷ Nor have Class Counsel and the NFL disclosed that ImPACT, the organization its expert Richard Hamilton consults for, has received funding from the NFL.⁸ ImPACT's website notes that "[t]he science behind ImPACT was developed in response to requests for neurocognitive testing from the NFL to help determine safe return to play." *Id.* ImPACT is the "league's *de facto* standard testing system."⁹ The settling parties likewise failed to disclose that Dr. Grant Iverson, a Visiting Professor of Physical Medicine and Rehabilitation at Harvard Medical School, has received funding from ImPACT, although they repeatedly rely on Iverson in their submissions. *See* NFL Br. 84 n.35; Millis Decl. ¶¶ 21, 22 (Dkt. No. 6422-34);

⁷ Sun, NY Giants' Steve Tisch Reveals His \$10M Plan To Further Concussion Research, Hollywood Reporter (Sept. 11, 2014), <http://www.hollywoodreporter.com/news/ny-giants-steve-tisch-reveals-731376> (attached as Nitz Supp. Decl. Ex. 3).

⁸ ImPACT, <https://www.impacttest.com/about/?ImPACT-Founders-6> (attached as Nitz Supp. Decl. Ex. 4).

⁹ Keating, NFL's Concussions Expert Also Sells Equipment to League, ESPN The Magazine (Aug. 10, 2007), <http://sports.espn.go.com/nfl/news/story?id=2967678> (attached as Nitz Supp. Decl. Ex. 5).

Keilp Decl. ¶¶ 30, 33 (Dkt. No. 6423-20).¹⁰ These associations demonstrate, at the very least, that the experts put forth by Class Counsel and the NFL have strong ties to the NFL that call into question their impartiality.

At the fairness hearing, Objectors asked that Class Counsel and the NFL be required to disclose the compensation the settling parties provided their experts. The class and this Court have a right to know. We reiterate that request.

5. The Tortured “Analysis” of the Experts Hired by the NFL and Class Counsel Fails To Refute the Accepted Medical Science Concerning CTE

Denying causal links is not new to large, vested corporate interests facing potential liability for causing broad-based injury. Tobacco companies disputed any causal link between smoking and lung cancer well into the 1980s and denied the addictiveness of nicotine into the 1990s. *See, e.g., Falise v. Am. Tobacco Co.*, 94 F. Supp. 2d 316, 330-32 (E.D.N.Y. 2000). Here too, the NFL – now supported by Class Counsel with their own financial incentive – argue that the Settlement’s failure to compensate CTE is the result of limited science linking football to CTE.¹¹ Those arguments lack merit.

a. Existing CTE Research Demonstrates Causation

The experts retained by the NFL and Class Counsel urge that the current research into CTE is flawed because it does not use control groups.¹² Fischer Decl. ¶ 11; Giza Decl. ¶ 16

¹⁰ Iverson, *Advances and Controversies in Neuropsychological Assessment: 7-Year Funding Disclosure*, http://www.sgtv.org/download/271113_iverson_advances_controversies_in_np_assessment.pdf (attached as Nitz Supp. Decl. Ex. 6).

¹¹ See, e.g., Class Counsel Br. 18; NFL Br. 47, 86; Klonoff Decl. ¶ 18; Yaffe Decl. ¶ 17 (“the causes of CTE are unknown”); Giza Decl. ¶ 19 (“any assumptions about a causal association between CTE and mild concussions or subconcussive brain injuries are premature”).

¹² Of course, this is notwithstanding that Co-Lead Class Counsel Seeger Weiss has been proclaiming throughout this litigation that “[m]ultiple medical studies have found direct correlation between football concussions and suffering from symptoms of chronic traumatic

(Dkt. No. 6423-18); Hovda Decl. ¶ 22 (Dkt. No. 6423-19); Schneider Decl. ¶ 26; Yaffe Decl. ¶ 66. Dr. Schneider, the NFL's expert, states that the "handful of studies that have been conducted relating to CTE are case reports or case series." Schneider Decl. ¶ 26. Dr. Yaffe, also the NFL's expert, states that "the only available studies [on CTE] are case reports." Yaffe Decl. ¶ 66. Both experts define "case report" and "case series" studies as those that do not have control groups. See Schneider Decl. ¶ 26 (case series studies "lack . . . a proper control group"); Yaffe Decl. ¶ 64 (case report and case series studies are those that "look retrospectively at exposure and outcomes and do not have control groups"). In the 2013 McKee study cited by Objectors, however, "[e]ighteen age- and gender-matched individuals without a history of repetitive mild traumatic brain injury **served as control subjects.**" McKee *et al.* 2013, *supra*, at 43 (emphasis added).¹³ The leading study **does** use a control group.

The experts retained by the NFL and Class Counsel also ignore the realities of mass-tort litigation in criticizing the lack of prospective, "double-blind randomized control trials" in the

encephalopathy, also known as CTE" and that "CTE is believed to be the most serious and harmful disease that results from NFL and concussions." See p. 1 n.1, *supra*. Co-Lead Class Counsel Anapol Schwartz has likewise stated that "[s]ymptoms of CTE include dementia, **aggression, depression, memory loss, confusion, impaired judgment and impulse control problems.**" *Chronic Traumatic Encephalopathy, NFL Concussion Lawsuits: An Anapol Schwartz Information Website*, <http://nfl-concussions-lawsuit.com/nfl-concussion-lawsuit-news/chronic-traumatic-encephalopathy/> (accessed Dec. 1, 2014) (attached as Nitz Supp. Decl. Ex. 7) (emphasis added). And Class Counsel The Locks Law Firm has pronounced that, "[f]or many years, all credible scientific evidence leads to the conclusion that individuals who suffer repeated and cumulative trauma to the head are at significantly increased risk for permanent brain injuries." The Locks Law Firm, *NFL Head Trauma Litigation*, <http://www.lockslaw.com/html/nfl.html> (accessed Nov. 30, 2014) (attached as Nitz Supp. Decl. Ex. 8).

¹³ Just a few paragraphs after stating that all studies on CTE are "case reports or case series" studies without a control group, Dr. Schneider notes that the 2013 McKee study had "[e]ighteen gender-matched individuals without a history of repetitive mild TBI [who] served as the control group." Schneider Decl. ¶ 31. Dr. Schneider criticizes the control group used in the CTE studies for not including additional permutations such as "non-athletes who experienced head trauma" and "athletes without TBI" but offers no scientific basis for why the McKee study's comparison against age- and gender-matched individuals without a history of head trauma was invalid. *Id.* ¶ 35.

area of CTE. Yaffe Decl. ¶ 66. As the Federal Judicial Center’s authoritative guide explains, “ethical and practical constraints limit the use of” double-blind, randomized trials in studying exposures thought to be harmful to human beings. Federal Judicial Center, *Reference Manual on Scientific Evidence* 555 (3d ed. 2011) (“FJC Man.”). It would be unethical, to say the least, to choose a sample of people and subject them at random to concussions and sub-concussive impacts to determine the effect of such impacts on their brains. Epidemiological studies, including retrospective ones like the studies addressing CTE, are the “primary generally accepted methodology for demonstrating a causal relation” in mass-tort cases. FJC Man. 551 n.2.

The experts retained by the NFL and Class Counsel also ignore the fact that causation in tort requires only “but for” and proximate causation. *See Robertson v. Allied Signal, Inc.*, 914 F.2d 360, 366-67 (3d Cir. 1990). The science shows that brain trauma is a but-for cause of CTE. CTE only presents in people with a history of repeated brain trauma – unlike ALS, Alzheimer’s disease, or Parkinson’s disease, which present in the general population of individuals who have not suffered repetitive brain trauma. *See* pp. 6-8, *supra*. Moreover, the NFL’s conduct was plainly a proximate cause of class members’ harm. “Proximate cause requires only ‘some direct relation between the injury asserted and the injurious conduct alleged,’ and excludes only those ‘link[s] that are too remote, purely contingent, or indirect.’” *Staub v. Proctor Hosp.*, 131 S. Ct. 1186, 1192 (2011). Unless the NFL’s conduct was a “trivial contribution” to the class members’ “cause of harm,” the NFL’s conduct is a proximate cause of the class members’ injuries. *Restatement (Third) of Torts: Phys. & Emot. Harm* § 36 (2010).

This Court – as well as the class for whom Class Counsel acts as a fiduciary – should take the highly experienced and esteemed group of plaintiffs’ lawyers serving as Class Counsel at their word when they alleged that “the NFL publicly inserted itself into the business of head

injury research” and “propagated its own industry-funded and falsified research to support its position, despite its historic role as the guardian of player safety, and despite the fact that independent medical scientists had already come to the opposite conclusion.” Class Action Complaint ¶ 84; *see also id.* ¶ 284. Even without the benefit of discovery, it is obvious that the NFL’s deception regarding the effects of head injuries resulting from playing in the NFL contributed to the harm that thousands of players have suffered.

b. *CTE Presents with Severe and Debilitating Mood and Behavioral Symptoms*

Class Counsel and the NFL minimize the mood and behavioral issues that accompany CTE. Class Counsel Br. 55; NFL Br. 6. Moreover, their experts dismiss Objectors’ call to compensate these symptoms as “premature” because they assert that there is no scientific consensus on the clinical profile of CTE, or whether mood and behavioral symptoms are part of that clinical profile. Schneider Decl. ¶ 29; Yaffe Decl. ¶¶ 67, 75; Fischer Decl. ¶ 11; Hamilton Decl. ¶ 29. Most of these experts argue that mood and behavioral issues are widespread in the general population, and therefore it is difficult to form conclusions about whether they are caused by CTE. Dr. Schneider’s analysis is typical: “Even assuming that these studies were later proven true (*i.e.* that the diagnostic and clinical profile of CTE includes mood and behavioral symptoms), there is the added concern that many of the reported neurobehavioral symptoms are quite common in the general population.” Schneider Decl. ¶ 39.

Such “CTE denier” arguments ignore reality. The relevant question is not whether symptoms of CTE are also present in the general population – and, notably, all of the Qualifying Diseases are also present in the general population – but whether they are more prevalent among those diagnosed with CTE than in the general population. *See* FJC Man. 602. After all, lung cancer presents in the general population absent a history of smoking, and emphysema presents

in the general population absent a history of coal dust exposure. That did not preclude tobacco or black lung litigation from going forward on causation issues.¹⁴ As noted above, there is widespread agreement that individuals with CTE suffer from debilitating mood and behavioral symptoms at a far higher rate than the general population – a fact that Co-Lead Class Counsel has already acknowledged. *See* p. 1 n.1 & pp. 7-8, *supra*. Significantly, suicidality is a recognized symptom of CTE at its earliest stages. *See McKee et al.* 2013, *supra*, at 56 tbl. 4. Sadly, those symptoms have been expressed in the most extreme sense in the deaths of at least seven former players who have taken their lives.¹⁵

¹⁴ Other experts likewise noted that symptoms like depression have many risk factors. Dr. Yaffe's analysis is typical: "Put simply, because mood and behavioral symptoms, such as depression, have many risk factors, these symptoms could be completely unrelated to CTE." Yaffe Decl. ¶ 75. But legal causation does not require establishing sole causation, only "substantial factor" causation. *See Restatement (Third) of Torts: Phys. & Emot. Harm* § 36 (2010).

¹⁵ *See* Delsohn, *OTL: Belcher's Brain Had CTE Signs*, ESPN (Sept. 30, 2014), http://espn.go.com/espn/otl/story/_/id/11612386/jovan-belcher-brain-showed-signs-cte-doctor-says-report (attached as Nitz Supp. Decl. Ex. 9); Smith, *Ex-Falcons Lineman Had Brain Disease Linked to Concussions*, CNN Health (Apr. 1, 2011), <http://www.cnn.com/2011/HEALTH/04/01/brain.concussion.dronett/index.html?hpt=Sbin> (attached as Nitz Supp. Decl. Ex. 10); McDonald, *Study Finds a Strong Correlation Between Repeated Head Trauma and Domestic Abuse*, The Washington Post (Oct. 22, 2014), <http://www.washingtonpost.com/news/morning-mix/wp/2014/10/22/study-finds-a-strong-correlation-between-repeated-head-trauma-and-domestic-abuse/> (attached as Nitz Supp. Decl. Ex. 11); Smith, *Lives After Junior*, ESPN (May 2, 2013) http://espn.go.com/nfl/story/_/id/9410051/a-year-later-one-junior-seau-close-friends-comes-for-ward-recount-version-descent (attached as Nitz Supp. Decl. Ex. 12); Associated Press, *Ex-Steelers Long Drank Antifreeze To Commit Suicide*, ESPN (Jan. 26, 2006), <http://sports.espn.go.com/nfl/news/story?id=2307003> (attached as Nitz Supp. Decl. Ex. 13); Solotaroff, *Dave Duerson: The Ferocious Life and Tragic Death of a Super Bowl Star*, Men's Journal (May 2011), <http://www.mensjournal.com/magazine/dave-duerson-the-ferocious-life-and-tragic-death-of-a-super-bowl-star-20121002>; Schwarz, *Expert Ties Ex-Player's Suicide to Brain Damage*, N.Y. Times (Jan. 18, 2007), <http://www.nytimes.com/2007/01/18/sports/football/18waters.html?pagewanted=all>.

6. The Opinions Expressed in the Declarations of the Experts Hired by the NFL and Class Counsel – Which They Offer To Support the Settlement – Are Inconsistent Internally and With the Opinions They Have Expressed Before They Were Retained by the NFL and Class Counsel

The experts retained by the NFL and Class Counsel make statements in their declarations that are either internally inconsistent or inconsistent with their other work. For example, Dr. Yaffe, the NFL's expert, states that: "It is my belief – and no scientific study says or demonstrates otherwise – that based on the current state of the science, the association between mild repetitive TBI and the qualifying diagnoses is not clear." Yaffe Decl. ¶ 39. She also asserts that "it is not yet possible to state with any certainty whether CTE causes any mood or behavioral symptoms." *Id.* ¶ 75. However, a 2011 study she co-authored states:

The association of TBI with dementia has also been documented in ***many studies*** involving nonveteran populations . . . Dementia pugilistica was first recognized in professional boxers in 1928. This condition, now referred to as ***chronic traumatic encephalopathy (CTE)***, has now been identified not only in boxers, but also in ***American football*** . . . CTE is thought to result from repeated multiple head injuries or sub-clinical impact to the head. CTE manifests initially with ***emotional and behavioral symptoms*** . . .¹⁶

Thus, in an earlier paper Dr. Yaffe endorsed essentially all of the widely accepted medical science that underlies Objectors' arguments.

For his part, Dr. Hovda expresses skepticism about the causal link between repeated concussions and CTE pathology. But a 2012 New York Times article states: "Dr. Hovda said that the growing body of research linking C.T.E. to multiple head injuries was 'quite remarkable.'"¹⁷ Similarly, though he now questions the link between CTE and mood and

¹⁶ Weiner, *et al.*, *Military Risk Factors for Alzheimer's Disease*, 9 *Alzheimer's & Dementia* 445, 446 (2013) (emphasis added) (attached as Nitz Supp. Decl. Ex. 14).

¹⁷ Dao, *Brain Ailments in Veterans Likened to Those in Athletes*, N.Y. Times (May 16, 2012), http://www.nytimes.com/2012/05/17/us/brain-disease-is-found-in-veterans-exposed-to-bombs.html?pagewanted=all&_r=0 (attached as Nitz Supp. Decl. Ex. 15).

behavioral issues, Hovda Decl. ¶ 21, in an article earlier *this year* he is quoted as saying: “Kind of like when you’re intoxicated, where you take away inhibition and then all of a sudden if you have an underlying violent or aggressive personality it’s more likely to surface . . . I’ve always said that concussions, or mild traumatic brain injuries, don’t just happen to one person, they happen to the entire family.”¹⁸ These statements are inconsistent with Dr. Hovda’s declaration challenging Objectors.

7. The Science Surrounding CTE Should Not Be Frozen by the Settlement

Even if the science surrounding CTE is continuing to evolve – and, as we show above, there is widespread agreement regarding fundamental points Dr. Stern and Dr. Gandy made in their initial declarations – that would provide a reason to *reject* the Settlement, not approve it. In case after case, the Supreme Court has made clear that settlement provisions must keep pace with changing science and medicine. *See Amchem Prods., Inc. v. Windsor*, 521 U.S. 591, 610-11 (1997) (settlement should not be approved if it “freez[es] in place the science” known at the time of settlement) (quoting *Georgine v. Amchem Prods., Inc.*, 83 F.3d 610, 630-31 (3d Cir. 1996)); *see also* 1 *McLaughlin on Class Actions* § 4:30 (11th ed.) (describing this point). If a class is “divided between holders of present and future claims,” then the class must be subdivided “with separate representation to eliminate conflicting interests of counsel.” *Ortiz v. Fibreboard Corp.*, 527 U.S. 815, 856 (1999). Otherwise, there is an irreconcilable conflict between the “‘currently injured’” who seek “‘generous immediate payments’” and those whose injuries have not yet been diagnosed. *Id.* (quoting *Amchem*, 521 U.S. at 626).

¹⁸ Carroll, *Could Brain Injuries Be Behind the NFL Rap Sheet?*, NBC News (Sept. 17, 2014), <http://www.nbcnews.com/storyline/nfl-controversy/could-brain-injuries-be-behind-nfl-rap-sheet-n205666> (attached as Nitz Supp. Decl. Ex. 16).

The NFL and Class Counsel ask this Court to ignore the Supreme Court's decisions in *Amchem* and *Ortiz*. The class representatives do not allege that they have or are at risk of developing CTE. Class Action Complaint ¶¶ 4, 7; see *Georgine*, 83 F.3d at 630-31 (describing the inherent conflict between present claimants, who must accept the science as it is today, and future claimants, who could count on more advanced science if they brought claims in the future). The Settlement bargains away the rights of class members with current and future cases of CTE. As knowledge about CTE grows, diagnoses will be more readily available. The NFL and Class Counsel nonetheless seek to freeze the science in place (when they do not ignore it altogether) in violation of *Amchem* and *Ortiz*.¹⁹

B. Compensating “Dementia” Does Not Equal Compensating CTE

Class Counsel and the NFL are unequivocal that the Settlement does not compensate CTE other than for those who died before July 7, 2014. See Seeger Decl. ¶ 9 (Dkt. No. 6423-3); NFL Br. 77-78. Yet, they claim CTE is “sort of compensated” through the Settlement’s compensation of “Level 1.5 Neurocognitive Impairment” or “Level 2 Neurocognitive Impairment.” See, e.g., NFL Br. 78. That convoluted argument fails.

First, there is no such thing as “Level 1.5 Neurocognitive Impairment” or “Level 2 Neurocognitive Impairment” except in the fantasy world of this Settlement.²⁰ The settling parties, for example, cite no peer-reviewed article establishing these “Levels” as commonly accepted methods to diagnose stages of dementia. That is because these “Levels” were created

¹⁹ Indeed, the Settlement anticipates advances in science, only to disallow recovery. See Settlement § 6.6(c) (disallowing any compensation for newly diagnosable diseases).

²⁰ It is troubling that Class Counsel would agree to a bogus “diagnosis” like this. One of the allegations of the complaint is that the NFL sponsored junk science to deceive players into believing that concussions do not present the serious health risks that they, in fact, present. Class Action Complaint ¶ 84. Class members are entitled to have their fiduciaries, Class Counsel, insist that the Settlement use recognized and accepted medical standards in establishing qualifying diagnoses and care.

for this Settlement. The renowned experts who have submitted declarations supporting the Objectors and address the “Levels” thus confirm that, although the Settlement uses the terms “Neurocognitive Impairment Level 1.0,” “Neurocognitive Impairment Level 1.5,” and “Neurocognitive Impairment Level 2.0,” those terms are not used as diagnostic or classification categories in the accepted medical and scientific community. *See p. 8, supra.*

Second, even if one were to accept the bogus dementia “diagnosis” used in the Settlement, a class member with CTE would never be able to receive the same maximum compensation through a dementia diagnosis as could be received through a diagnosis of death with CTE before July 7, 2014. And many suffering some of the most serious symptoms of CTE – such as suicidality – would ***never be compensated*** through a dementia diagnosis:

Compensation for Dementia ≠ Compensation for CTE



As this chart shows, an individual who dies from CTE before July 7, 2014 can receive a maximum award of \$4 million for Stage 1, Stage 2, Stage 3, or Stage 4 CTE. An individual suffering from Stage 1 or Stage 2 CTE who dies after July 7, 2014 receives nothing. And an individual suffering from Stage 3 or Stage 4 CTE who dies after July 7, 2014 must navigate through the complicated claims process and establish that he suffers from “Level 1.5

Neurocognitive Impairment” or “Level 2 Neurocognitive Impairment” before recovering up to \$1.5 million or \$3 million, respectively.²¹

II. The Failure To Credit NFL Europe Play and the Application of the 75% Non-NFL Traumatic Brain Injury Offsets Render the Settlement Unfair

The failure to credit play in NFL Europe, while requiring a release from those who played in NFL Europe, separately renders the Settlement unfair. As demonstrated by Objectors at the fairness hearing, the contention that excluding credit was justified because NFL Europe had a shorter season and was really a “developmental league” holds no water.²² Fairness Hearing Tr. 90-92. The NFL Europe players have suffered at the hands of the NFL in the same way as those who played in the United States. In fact, many players played in both leagues. *See*

²¹ Individuals with CTE are similarly not assured a recovery just because, in some instances, they might also have Alzheimer’s Disease, Parkinson’s Disease, or ALS. There is a significant lack of comorbidity with those qualifying diagnoses. The NFL’s experts admit as much. Citing Dr. McKee’s 2013 study, Drs. Yaffe and Schneider assert that at least 89% of the football players in McKee’s study would qualify for a payment under one of the Settlement’s non-CTE Qualifying Diagnoses. Yaffe Decl. ¶ 83; Schneider Decl. ¶¶ 51-52. Even assuming the accuracy of Dr. Yaffe’s and Dr. Schneider’s analyses, more than 1 out of every 10 class members suffering from CTE would not receive payment under the Settlement. The settling parties offer no justification for that omission. Nor do they explain why an individual who has been suffering from CTE for years or even decades should be subject to the offsets built into the Settlement based on the individual’s age at the time of Qualifying Diagnosis. *See* Settlement Ex. B-3; Gandy Decl. ¶ 7. In any event, Drs. Yaffe and Schneider misinterpret Dr. McKee’s study. Of the 68 cases of CTE in Dr. McKee’s 2013 study, only 37% had a comorbid diagnosis. McKee *et al.* 2013, *supra*, at 61. And of those exhibiting a comorbid disease, 76% (19 of 25) had Stage 3 or Stage 4 CTE. *Id.* at 49-51 tbl. 2. Similarly, dementia was found *exclusively* in those with Stage 3 or Stage 4 CTE. *Id.* at 56 tbl. 4. Thus, compensating comorbidities leaves individuals suffering from Stage 1 and Stage 2 CTE – and the devastating behavioral and mood impairments so common in those stages, *see, e.g.*, Stern Decl. ¶¶ 32-35 – without compensation. That result is all the more unjust given that Stage 1 and Stage 2 CTE in individuals who died before July 7, 2014 will receive a maximum \$4 million payout.

²² Class Counsel, in one of his many media appearances attempting to sell the Settlement, offered a different, albeit bizarre, justification. He urged that “NFL Europe, um, is part of the deal, but, you know, nobody, I think, is going to argue that they’re playing at the level that the NFL in the United States is playing at or that they’re getting hit like they are there.” Audio file: Interview of Chris Seeger, CBS Sports Radio, The Mojo Show, at 9:09-9:45 (aired July 10, 2014). Neither Class Counsel nor the NFL has yet had the temerity to offer this justification to the Court.

Heimburger Decl. ¶¶ 11-12 (Dkt. No. 6230-1) (describing time spent playing in both Leagues, as well as the head trauma and symptoms sustained in each); Morey Decl. ¶ 7 (Dkt. No. 6201-17). Tellingly, neither the NFL nor Class Counsel even attempted to support this discriminatory treatment of NFL Europe players – or explained how Class Counsel’s own expert was wrong when he said in his sworn declaration that this unfair treatment of NFL Europe players should be fixed. *See* Klonoff Decl. ¶ 16 (“[T]he parties should consider modifications to the settlement agreement to address the NFL Europe issue.”); *id.* ¶ 93 (similar).

Similarly, the application of 75% award reductions in the case of a single instance of non-NFL traumatic brain injury or stroke creates an indefensible unfairness. While some reduction might be inappropriate, Class Counsel and the NFL have offered no evidence to support such a drastic reduction. The draconian offset for a *single instance* of non-NFL traumatic brain injury or stroke simply makes no sense when Class Counsel themselves agree that some players “*suffered more than one hundred* mild traumatic brain injuries” during their careers. *See* p. 1 n.1, *supra* (emphasis added).

III. The Class Conflicts Caused by the Settlement’s Treatment of CTE, NFL Europe Play, and Non-NFL Traumatic Brain Injuries and Strokes Demonstrate a Lack of Adequate Representation in Violation of Federal Rule of Civil Procedure 23(a)(4)

Both Class Counsel and the NFL refused to address at the fairness hearing the fact that neither class representative alleged that: he has or is at risk of having CTE; he played in the NFL Europe; or he is subject to the 75% offsets. *See* Class Action Complaint ¶¶ 4, 7. As structured, the Settlement creates conflicts within the class.

The Third Circuit addresses intraclass conflicts through the framework of Rule 23(a)(4)’s adequacy requirement. *See Dewey v. Volkswagen Aktiengesellschaft*, 681 F.3d 170, 183-84 (3d Cir. 2012). The “linchpin of the adequacy requirement is the alignment of interests and incentives between the representative plaintiffs and the rest of the class.” *Id.* at 183. Apart from

the basic unfairness created by these conflicts, the conflicts demonstrate a lack of adequate representation that precludes class certification under Rule 23(a)(4). The rights of class members were bargained away. Thus, approval should be denied on this separate ground.

IV. Procedural Hurdles Will Prevent Many Class Members from Ever Recovering

The confusing and burdensome process the Settlement imposes on class members will limit the number of meritorious claims the NFL actually has to pay. A class member does not have an automatic right to receive benefits from the Settlement. A class member must instead opt in to the Settlement by registering with the Claims Administrator within six months or be forever barred from compensation. *See Settlement § 4.2.* The Baseline Assessment Program, moreover, is capped at \$75 million. *See id. § 23.3(d).* If it runs out, a class member will be unable to participate. And even if it does not run out, Class Counsel and the NFL decided that the Baseline Assessment Program should terminate decades before the 65-year term of the Settlement ends. *See id. § 5.5.* The Baseline Assessment Program also does not address mood and behavioral symptoms.

The Settlement, moreover, requires a “MAF physician” approved by the NFL to provide a Qualifying Diagnosis. *See Settlement § 6.5(a).*²³ The testing protocol MAF Physicians administer is burdensome and impractical. *See Objection 72-73.* As several declarations make clear, the Settlement’s diagnostic or classification categories of “Neurocognitive Impairment

²³ A “MAF Physician” is a “board-certified neurologist, board-certified neurosurgeon, or other board-certified neuro-specialist physician” approved by the NFL who is the only type of doctor “authorized to make Qualifying Diagnoses.” Settlement § 2.1(www). There is no assurance in the Settlement that a MAF Physician will be within 50, 100, or even 500 miles of a class member, even though a class member cannot recover unless a MAF Physician provides a Qualifying Diagnosis. That will punish class members living in areas where there are shortages of neurologists – a shortfall that affects most of the country. *See Dall, et al., Supply and Demand Analysis of the Current and Future US Neurology Workforce*, 81 Neurology 470, 470-71 (2013) (noting that there is already an “11% shortfall” in neurologists, which is expected to grow to a “19% shortfall” by 2025) (attached as Nitz Supp. Decl. Ex. 17).

Level 1.0,” “Neurocognitive Impairment Level 1.5,” and “Neurocognitive Impairment Level 2.0” are unknown in the medical and scientific community. *See* p. 8, *supra*. The testing protocol has not been validated for the purposes outlined in the settlement in the general, athlete, or football populations. Stern Supp. Decl. ¶ 15.

As Dr. Stern explains, the current testing protocol was designed by individuals who do not specialize in dementia or neurodegenerative disease. Stern Supp. Decl. ¶ 17. The protocol “is not appropriate for evaluating whether retired professional football players have neurodegenerative diseases such as CTE or Alzheimer’s disease.” Stern Decl. ¶ 43. Among other problems, the protocol imposes a burdensome, five-hour test that will result in many class members not finishing the test. *Id.* ¶¶ 43-44. If this protocol is approved, it will “unfairly deprive at least some otherwise eligible persons with measurable cognitive deficits of compensation.” *Id.* ¶ 46.

Even if a player receives a Qualifying Diagnosis, he still faces many hurdles before recovering under the Settlement. He must submit a Claim Package within two years of receiving a diagnosis. *See* Settlement § 8.3(a)(i). And even though the NFL already has the information, a player who qualifies for an award will receive at least an 80% offset unless he can provide sufficient evidence that he played in the NFL. *Id.* § 6.7(b)(i)(8); *see id.* § 8.2(a)(v).

Finally, the appellate process is biased against the class. A class member must pay \$1,000 for an appeal to this Court but the NFL does not pay anything. *See* Settlement § 9.6(a)-(b). If a Claims Administrator denies an award, a class member must present clear and convincing evidence of error, and must do so in five pages with no reply. *Id.* § 9.7. As this procedural morass demonstrates, the settling parties have designed a process that will impede rather than assist class members who merit an award under the Settlement.

V. Class Notice Has Caused Confusion Among the Class

The class notice was false and misleading. The notice states that all cases of CTE will receive compensation: Paragraph 14 of the long-form notice, for example, defines “Qualifying Diagnoses” to broadly include “Death with CTE” and then notes that “A Qualifying Diagnosis may occur at any time until the end of the 65-year term of the Monetary Award Fund.” *See* Objection 41. That is not true. Nor have the settling parties ever sought to defend that statement. Instead, the settling parties state that a different part of the notice clarifies that the Settlement provides recovery for “Death with CTE *prior to July 7, 2014.*” NFL Br. 156 (quoting Long-Form Notice at 6); *see also* Class Counsel Br. 40. As Objectors previously explained, however, a notice that contains both false and technically true statements is defective as a matter of law. Objection 45-48; *see also Eubank v. Pella Corp.*, 753 F.3d 718, 728 (7th Cir. 2014) (vacating approval of settlement, in part because notice was “incomplete and misleading” and did not “provide a truthful basis for deciding whether to opt out.”); *Pearson v. NBTY, Inc.*, No. 12-1245, 2014 WL 6466128, at *5 (7th Cir. Nov. 19, 2014) (Posner, J.) (noting deficient notice).

The false and misleading notice, moreover, was not without effect. Class member Judson Flint, for example, explained in his August 21, 2014 objection that:

I’m writing to suggest that CTE be addressed in living players because there is technology being developed that will diagnose that condition if not now somewhere in the near future. The settlement only addresses CTE when a player dies and I think the court should have a clause in the settlement that will allow players to be compensated while they are still alive to take advantage of the benefits. . . . I love my family and would like for them to be compensated if that condition is found but as a player I would rather my family and I could enjoy the benefits together while I’m still alive.

Dkt. No. 6347. Mr. Flint believes that, if he dies with CTE, his family will receive payment. Not so. Class member Eric Williams held the same incorrect belief: “Players diagnosed with CTE (living) today, have to kill themselves or die for their family to ever benefit.” Dkt. No.

6345.²⁴ Other former players as well as the media have likewise displayed confusion over the scope of the Settlement's coverage for CTE. Objection 52-53.

The hundreds of players who have opted out or objected to the Settlement demonstrate why the Settlement should not be approved. *See GM Trucks*, 55 F.3d at 812-13 & n.32 (noting an opt-out rate of 0.091% and an objection rate of 0.11% but ruling that “[t]he class reaction factor plainly does not, contrary to the district court’s conclusion, weigh in favor of approving the settlement”). Even apart from those protesting voices, the “informational barriers to class opposition” – here, a false, misleading, and confusing notice – further counsel against drawing any “inference[s]” about whether class members who did not opt out or object to the Settlement actually think it is a good deal. *Id.* at 812. The defective notice provides an independent reason to deny approval.

VI. The Public Interest and Public Opinion Disfavor Final Approval

The issues presented in this litigation have broad implications beyond the serious damage suffered by any one individual class member and those closest to him. The central allegations are that the NFL lied to its players and the public – indeed, elaborately so through sponsoring junk science – to deceive them about the substantial health risk attached to playing football. Class Action Complaint ¶ 84. After conducting extraordinary scientific, legal, and factual research, Class Counsel alleged that the NFL defrauded players out of their health, thereby injuring not only themselves but also their wives, girlfriends, families, and others around them.

²⁴ At the fairness hearing, Class Counsel suggested that Mr. Williams's objection was irrelevant because he submitted it on July 3, 2014, before the Court preliminarily approved the Settlement. Fairness Hearing Tr. 198. But Class Counsel ignored the fact that their propaganda campaign in support of the Settlement, which contained much of the same misleading information contained in the notice, predated the notice and Mr. Williams's objection. *See DeGory, New Concussion Settlement a Win-Win*, SportsIllustrated.com (June 26, 2014), <http://mmqb.si.com/2014/06/26/new-concussion-settlement-kevin-turner>; Objection 48-52; NFL Concussion Class Settlement (May 1, 2014), <https://www.youtube.com/watch?v=9EWNBNGMoEk>.

Given the tremendous popularity of the NFL, it is not surprising that the issues of its conduct in dealing with concussions and brain trauma have drawn scrutiny from the media. The PBS documentary and book *League of Denial* did much to expose the NFL's bad behavior. *See* Nitz Supp. Decl. Exs. 18 & 19. *League of Denial* so struck a nerve with the NFL that it reportedly pressured ESPN to pull ESPN's name and logo from the documentary even though the book was written by two ESPN reporters.²⁵ Others have been similarly critical of defendants and this Settlement – although it is hard to be heard above the din of the NFL's non-stop media machine.²⁶

Not surprisingly, a number of highly credible organizations have filed amici curiae memoranda arguing against final approval. These include: Public Citizen, one of the nation's most prominent public advocacy organizations; the Brain Injury Association of America, the country's oldest and largest nationwide brain injury advocacy organization; and the Parents

²⁵ See Sandomir, *Partly by Shunning Documentary, ESPN Lifts It*, N.Y. Times (Oct. 9, 2013), <http://www.nytimes.com/2013/10/10/sports/football/by-shunning-concussion-documentary-espn-gives-it-a-lift.html> (attached as Nitz Supp. Decl. Ex. 20).

²⁶ See, e.g., Erichson, *The NFL Concussion Settlement: Class Action Exploitation*, Mass Tort Litigation Blog (Nov. 18, 2014), http://lawprofessors.typepad.com/mass_tort_litigation/2014/11/the-nfl-concussion-settlement-and-class-action-exploitation.html (attached as Nitz Supp. Decl. Ex. 21); Kaplen & De Caro, *Op-Ed: Concussion Settlement Is Deeply Flawed*, National Law Journal (July 21, 2014), <http://www.nationallawjournal.com/id=1202663714809/OpEd-Concussion-Settlement-Is-Deeply-Flawed> (attached as Nitz Supp. Decl. Ex. 22); Daugherty, *Settlement II: Concussion Cases Become a Headache for NFL*, San Diego Reader (July 9, 2014), <http://www.sandiegoreader.com/news/2014/jul/09/sporting-settlement-II> (attached as Nitz Supp. Decl. Ex. 23); Pearson & Feeley, *NFL Critics Say Concussion Accord Ignores Broken Lives*, Bloomberg (Nov. 19, 2014), <http://www.bloomberg.com/news/2014-11-19/nfl-settlement-objectors-seek-to-sway-judge-from-approval.html> (attached as Nitz Supp. Decl. Ex. 24); Hruby, *The NFL Concussion Settlement Is Pure Evil*, Vice Sports (Oct. 28, 2014), <https://sports.vice.com/article/the-nfl-concussion-settlement-is-pure-evil> (attached as Nitz Supp. Decl. Ex. 25); Hruby, *The NFL Dodges on Brain Injuries*, The Atlantic (Sept. 4, 2014), <http://www.theatlantic.com/entertainment/archive/2014/09/the-nfls-concussion-settlement-not-acceptable/379557> (attached as Nitz Supp. Decl. Ex. 26); Reed, *Time's Running Out To Stop Bad NFL Concussion Settlement*, League of Fans (Nov. 14, 2014), <http://leagueoffans.org/2014/11/14/times-running-out-to-stop-bad-nfl-concussion-settlement> (attached as Nitz Supp. Decl. Ex. 27).

Concussion Coalition, a group of parents of children who have had life-altering concussions.²⁷

Notably, not a single organization has filed in support of the Settlement.

Thus, it is fair to say that those who are interested and not a party to the litigation think this is a bad deal that should not receive final approval.

Through their actions, Class Counsel – with their \$112.5 million clear sailing agreement at stake – have done nothing to calm the fears of those who see the Settlement as a sell-out. For starters, no discovery was done in this case and Class Counsel have refused to acknowledge what, if any, informal exchange of information occurred concerning the merits of this case. Thus, in settling the matter, the NFL will be allowed to continue to conceal what have been described as shameful and dangerous secrets not only from the public but from the players it defrauded.

Once settlement negotiations began, Class Counsel took great care to keep the class in the dark with no visibility in the negotiating process. Members of the class were vocal but there was little they could do.²⁸

At every turn, Class Counsel refused to provide information about the Settlement and how it was reached. Notwithstanding that the fundamental concerns of the Morey Objectors were first raised on May 5, 2014, upon the filing of their motion for leave to intervene, *see* Dkt. No. 6019, at 1-2, 13-21, at no time did Class Counsel seek to provide information and address

²⁷ Class Counsel have aggressively opposed any organization making its views known to this Court through an amicus memorandum. *See* Brain Injury Association of America (Dkt. No. 5608); Response in Opposition to BIAA's Motion for Leave To File Amicus Brief by Plaintiff (Dkt. No. 5633); Public Citizen (Dkt. No. 6214); Response to Public Citizen's Motion for Leave To File Amicus Curiae Memorandum by Plaintiff (Dkt. No. 6330); Parents Concussion Coalition (Dkt. No. 6427); Response in Opposition to PCC's Motion to File Amicus Brief by Plaintiff (Dkt. No. 6432).

²⁸ *See* Fainaru & Fainaru-Wada, *Lawyers Fight Over Settlement Details*, ESPN.com (Jan. 24, 2014), http://espn.go.com/espn/otl/story/_id/10346091/lead-negotiator-facing-strong-opposition-concussion-settlement.

the concerns expressed to the Court. Further, they opposed the motion filed by counsel for Mr. Duerson seeking dissemination of data relied on to reach the Settlement, *see* Dkt. No. 6146; opposed the motion filed by counsel for Mr. Duerson seeking to depose Mr. Seeger, *see* Dkt. No. 6182; opposed the motion filed by the Morey Objectors seeking leave to file limited discovery requests, *see* Dkt. No. 6183; and opposed the motion filed by the Morey Objectors requesting an order that Class Counsel and the NFL produce the evidence upon which they intended to rely at the fairness hearing and the evidence upon which they relied when they agreed to the Settlement, *see* Dkt. No. 6333.

Instead, Class Counsel – the fiduciary and guardian of the class – waited until seven days before the fairness hearing to provide any information to attempt to justify what they had done. Along with the NFL, they then submitted a combined 250 pages of briefing along with over 1,250 pages of exhibits, including 11 expert affidavits. The transparent intent of this eleventh-hour “disclosure” clearly was to prevent any meaningful scrutiny of what Class Counsel had done in striking their deal. The class deserves better. So does the public, given the broad interest in the issues.

If, as Class Counsel contends, this is truly a fair and adequate Settlement for the class, then they should welcome review and celebrate their fine work. If, on the other hand, this is a settlement that fails to compensate the core injury of living class members, has multiple conflicts within the class, and employs a complex claims process that unquestionably will limit payments by the NFL – as well as provide Class Counsel with a pot of gold along the way – then it is understandable that they would fight so hard to avoid revealing what transpired.

The shortcomings of the Settlement – particularly the failure to properly compensate CTE – are breathtaking. Approval of such an inadequate deal reached under these clandestine

conditions would fly in the face of fairness as well as public policy favoring openness in court proceedings. “Publicity is justly commended as a remedy for social and industrial diseases. Sunlight is said to be the best of disinfectants; electric light the most efficient policeman.” Brandeis, *Other People’s Money* 62 (National Home Library Foundation ed. 1933).

VII. The Settlement Does Not Guarantee That Funds Will Be Available To Pay Claims During the Full Term of the Settlement

The Settlement, though it extends for 65 years, provides no guarantee that money will exist in the Statutory Fund to pay players who have qualifying claims. *See* Dkt. No. 6243, at 10-12 (Utecht Objection). The Settlement provides that, no later than 10 years after the effective date of the Settlement, the NFL will deposit funds in a Statutory Trust “sufficient to satisfy the NFL Parties’ remaining anticipated payment obligations” for years 11-65. Settlement § 25.6(d). But that guarantee is illusory. The NFL decides how much money to deposit in the fund and the NFL may withdraw funds from the Statutory Trust. *Id.* While the NFL’s withdrawal of funds is subject to court approval, the Settlement provides that such approval “shall be granted” unless the NFL is in material default, or if it can be shown by “clear and convincing evidence, that the proposed withdrawal would materially impair the Settlement Agreement.” *Id.*

At the fairness hearing, the Settling Parties scoffed at the idea that the security provisions of the Settlement could even matter, because the NFL would always be ultimately liable for the claims. Fairness Hearing Tr. 203-04. It may seem unlikely that the NFL will not be able to make the payments 65 years from now, but public tastes change and corporate fortunes fade. One need only look to the decline in the popularity of boxing in the past 65 years as an example. History, moreover, is replete with instances of corporate titans in one generation that become has beens in the next. The Pennsylvania Railroad, Lehman Brothers, and Bethlehem Steel all illustrate this point. For this reason too, the Settlement should not be approved.

VIII. Potential Improvements to the Settlement

Objectors have consistently maintained – and continue to maintain – that this case should be settled. *See* Dkt. 6420 at 9-11; Fairness Hearing Tr. 69, 102, 105. But any settlement must meet the requirements of Rule 23 and due process. Objectors respectfully submit that the following list of CTE-related potential improvements could go a long way toward ensuring that the Settlement is fair, adequate, and reasonable:

- Lift the monetary cap on the Baseline Assessment Program to allow for earlier diagnosis and meaningful treatment of CTE, including its serious early symptoms
- Extend the Baseline Assessment Program to the full term of the Settlement
- Provide a benefit for Death with CTE diagnosed post-mortem that is graduated downward over time to account for the fact that players will be receiving the benefit of enhanced treatment through the Baseline Assessment Program
- Provide that the issue of diagnosis of CTE in the living be revisited by counsel and the Court – advised by an agreed-upon panel of medical experts – every three years for the next 12 years, with the possibility of the Settlement being modified to allow for some form of compensation for CTE while alive instead of after death
- Include compensation for CTE while living once reliable tests are developed; treat all symptoms of CTE – Stages 1-4
- **Or** eliminate CTE from the release

Objectors also submit that other meaningful changes to the Settlement could be made in an effort to make it fair, adequate, and reasonable. These include:

- Give credit for play in NFL Europe
- Reduce non-NFL traumatic brain injury/stroke offsets to a reasonable, evidence-based percentage
- Eliminate the opt-in requirement
- Eliminate the requirement that a “MAF physician” provide a Qualifying Diagnosis
- Use a recognized system for testing and diagnosis grounded in accepted medical science

- Eliminate the appeal fee for a class member and limit the number of appeals the NFL can take per year
- Re-notice the class with clear, consistent, and accurate language

Although the lack of compensation for current and future cases of CTE is the major failure of the Settlement, numerous other flaws independently and collectively render it unfair and require its rejection. That said, Objectors believe that perhaps with the continued guidance of this Court, a settlement that is fair, adequate, and reasonable can be achieved.

CONCLUSION

Final approval of the Settlement should be denied.

Dated: December 2, 2014

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CERTIFICATE OF SERVICE

I hereby certify that on December 2, 2014, I caused the foregoing supplemental brief to be filed with the United States District Court for the Eastern District of Pennsylvania via the Court's CM/ECF system, which will provide electronic notice to all counsel and parties.

/s/ Steven F. Molo

**UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA**

IN RE: NATIONAL FOOTBALL LEAGUE
PLAYERS' CONCUSSION INJURY
LITIGATION

No. 2:12-md-02323-AB
MDL No. 2323

Kevin Turner and Shawn Wooden,
*on behalf of themselves and
others similarly situated,*

Civil Action No. 2:14-cv-00029-AB

Plaintiffs,

v.

National Football League and
NFL Properties, LLC,
successor-in-interest to
NFL Properties, Inc.,

Defendants.

THIS DOCUMENT RELATES TO:
ALL ACTIONS

SUPPLEMENTAL DECLARATION OF ROBERT A. STERN, PH.D.

Robert A. Stern, Ph.D., affirms under penalty of perjury the truth of the following facts:

1. I am a Professor of Neurology, Neurosurgery, and Anatomy & Neurobiology at Boston University School of Medicine. I have previously submitted a Declaration (filed 10/6/14) with highlights of my experience, research, and qualifications relevant to the opinions expressed below. I reaffirm the statements set forth in my October 6, 2014 declaration. My complete *curriculum vitae* was attached as Tab A to my October 6, 2014 declaration.

2. My statements and views included in this declaration are mine alone and do not reflect those of Boston University or any of the departments and centers with which I am involved. Specifically, they do not reflect the views of the Boston University Alzheimer's Disease Center, the Boston University CTE Center, or the Boston University Center for the Study of Traumatic Encephalopathy; nor do they reflect the views of any of the faculty, staff, or administration associated with any of these organizations.

3. I have not received any financial payments for preparing this Declaration from any source, including any attorney or plaintiff in this case.

I. CHRONIC TRAUMATIC ENCEPHALOPATHY IS A BRAIN DISEASE

4. CTE is not the same as a brain injury or a concussion. It is a brain disease, accepted as such by the overwhelming majority of thought leaders in the field of neurodegenerative disease. It is described in leading textbooks of Neurology. For example, in “Adams and Victor’s Principles of Neurology, 10th edition” (Ropper, Samuels, and Klein; McGraw Hill, New York, 2014) there is an entire section devoted to “Chronic Traumatic Encephalopathy.” In yet another important textbook of Neurology, “Merritt’s Neurology, 12th edition” (2010, Rowland and Pedley; Lippincott, Philadelphia), there is also a devoted section on “Chronic Traumatic Encephalopathy.”

5. The Centers for Disease Control and Prevention (CDC), in its website for the National Institute for Occupational Safety and Health (NIOSH; <http://www.cdc.gov/niosh/updates/upd-09-07-12.html>, attached as Tab A), includes the following:

“Other research suggests that chronic traumatic encephalopathy (CTE), a neurological disease that can occur years after exposure to repetitive concussive injuries and exhibits symptoms similar to Alzheimer’s disease and ALS in some individuals, has been identified in players who have sustained football-related concussions. The study points out that since CTE is a newly defined diagnosis, it is possible that some deaths attributed to Alzheimer’s disease or ALS on death certificates may actually have been related to CTE, though authors were not able to directly assess this in their study.”

6. A 2013 “Report to Congress on Traumatic Brain Injury in the United States: Understanding the Public Health Problem among Current and Former Military Personnel” (www.cdc.gov/.../pdf/Report_to_Congress_on_Traumatic_Brain_Injury_2013-a.pdf, attached as Tab B) states: “Multiple severe concussive and sub-concussive injuries, like those reported in boxers who engaged in the sport for several years, are known to cause a delayed dementia syndrome (dementia pugilistica or chronic traumatic

encephalopathy.)” That publication was authored by the CDC and the National Institutes of Health (NIH) in collaboration with the Department of Defense (DOD) and the Department of Veterans Affairs (VA).

7. CTE has been described in the medical and scientific literature since the 1940’s. Prior to that time, it was referred to as “Punch Drunk” or “Dementia Pugilistica” when it was believed to occur primarily in boxers. Although the scientific and medical community has known of CTE for almost a century, it is only in the past 10-12 years that it has received more scientific attention. I have stated repeatedly, in professional lectures, in the media, and in scientific journals, that there is much to be learned about CTE. However, the same could be said about other neurodegenerative diseases, such as Alzheimer’s disease, ALS, frontotemporal lobar degeneration, and others. That is true even though these other diseases have received more scientific investigation than CTE. In fact, we do not yet know the causes of these other diseases, nor can they be definitively diagnosed during life.

8. CTE has been described in the scientific literature for many decades as involving significant changes in mood and behavior, as well as in cognition. In fact, the changes in mood and behavior are, in large part, what led to the public awareness of this disease in former NFL players.

II. DIAGNOSIS OF CTE DURING LIFE

9. I stated in my October 6, 2014 declaration that a clinical diagnosis of CTE would likely be possible within the next 5 to 10 years, and definitely before the conclusion of the 65-year Settlement term. I reaffirm that position. A clinical diagnosis is a diagnosis of CTE in a living person based on clinical presentation and appropriate objective biological tests or biomarkers. I have reviewed the declarations of Drs. Bernick, DeKosky, Hof, Shenton, Stone, Weiner, Wisniewski, and Zhang, all of whom express the opinion that a “clinically accepted diagnosis of CTE” will likely be possible within the next decade and certainly before the Settlement term expires. I understand that statement to mean, as would those of expertise in the field such as the declarants identified above, that a diagnosis of CTE will be possible in a living person.

10. As I stated in my previous Declaration changes in mood and behavior occur in the general population. Those mood and behavioral changes, however, occur more frequently in individuals with CTE than in the general population. Once a clinical diagnosis of CTE is possible, CTE can be identified as the likely

cause of those mood and/or behavioral changes. Just because there is no currently accepted and validated diagnosis of CTE in the living does not mean a diagnosis will not be possible through the 65-year term of the Settlement.

11. Alzheimer's disease ("AD") is a distinct disease from CTE and also cannot be diagnosed accurately during life. That is, the accurate diagnosis of AD requires a neuropathological examination following death, with the demonstration of excessive depositions of abnormal forms of two proteins, amyloid and tau. However, in recent years, there have been tremendous advances in neuroscience that have improved the accuracy of several tests to diagnose AD during life. One of these tests is a PET scan that is now FDA approved. That scan rules out AD by demonstrating that there is little or no accumulation of amyloid in the brain. There are no FDA approved tests at this time that can positively identify AD as the cause of dementia in the living. However, there are currently clinical trials underway of a new PET scan test to measure and detect abnormal tau in the brain during life. These studies are being conducted on individuals with suspected AD as well as suspected CTE. This test is one of the many promising new technologies that may soon lead to the ability to diagnose CTE in the living.

12. In fact, in addition to the developments and research described in my October 6 Declaration, the National Institutes of Health (through a contribution from the NFL to the Foundation for NIH) will soon be funding a seven-year, \$16 million study to "Detect, Define and Measure the Progression of Chronic Traumatic Encephalopathy (<http://grants.nih.gov/grants/guide/rfa-files/RFA-NS-14-012.html#sthash.4Oz7Fv5n.dpuf>). That request for applications explains that the study is "expected to obtain and use longitudinal data, such as MRI and PET imaging, cognitive and behavioral assessments, and CSF or blood for genomic and proteomic analysis, to increase knowledge concerning the neurological mechanisms of CTE as it evolves over a 3 - 5 year period and enable the development of a consensus, evidence-based clinical diagnosis." It is highly likely that this large NIH-funded project described above will result in an accelerated ability to detect and diagnose CTE during life within the next seven years.

13. It is clear that the advances of neuroscience are at an all-time high, with knowledge and technology leading to exciting new discoveries at an increasingly fast rate. With the advances that have already

taken place in new diagnostic procedures and biomarkers for AD and other neurodegenerative diseases, it is likely, if not assured, that there will be accurate, FDA approved, and clinically accepted methods to diagnose CTE during life over the five to ten years (in large part due to the important new NIH-funded project) and definitely over the 65 years of the proposed Settlement.

III. THE DIAGNOSTIC CATEGORIES OF NEUROCOGNITIVE IMPAIRMENT LEVELS 1, 1.5, AND 2

14. CTE is a neurodegenerative disease. CTE is not a traumatic brain injury nor is it a concussion. It is a progressive brain disease that begins early in life. As it destroys more and more brain tissue, it leads to a variety of symptoms, including mood and behavioral symptoms as well as cognitive decline. The examination of individuals with neurodegenerative diseases, such as CTE and AD, requires special training, experience, and expertise. The development of criteria to classify the level of neurocognitive impairment associated with CTE requires knowledge of and expertise in the clinical presentation of neurodegenerative disease, including dementia. The classification scheme of Neurocognitive Impairment 1, 1.5, and 2 included in the proposed Settlement, does not exist anywhere in the neurodegenerative disease or dementia literature.

15. A diagnostic classification scheme for neurocognitive impairment, especially one that is used for the purpose of financial compensation, must undergo extensive validation studies, specifically in the population being examined – here, the population of former NFL players . This process normally takes several years to complete. The algorithm included in the proposed Settlement has not undergone any validation study. Although each individual test within the battery has been scientifically validated, the test battery in its entirety, and most importantly, the specific algorithm used to define Neurocognitive Impairment categories, has not been validated in any population, much less the population of individuals who will be the classified in this proposed Settlement, i.e., former NFL players.

16. According to Dr. Scott Millis' Declaration, (Dkt. No. 6422-34) the "algorithm was based on extensive research performed by Dr. Grant Iverson—one of Class Counsel's consultants." He cites three publications to support this statement, referring to them as "studies" (Brian L. Brooks et al., *Developments in Neuropsychological Assessment: Refining Psychometric and Clinical Interpretive Methods*, 50 Canadian Psychol. 196, 2009, "Brooks Study"; Brooks, B. & Holdnack, J., *Evidence-Based Neuropsychological JA4595*

Assessment Following Work-Related Injury, in Neuropsychological Assessment of Work-Related Injury 360, 360-400; in Shane S. Bush & Grant L. Iverson eds., 2012; “Holdnack Study”; and Grant L. Iverson & Brian L. Brooks, *Improving Accuracy for Identifying Cognitive Impairment, in The Little Black Book of Neuropsychology: A Syndrome-Based Approach* 923, 923-950; in Mike R. Schoenberg & James G. Scott eds., 2011; “Iverson Study”). Two of these publications are chapters in books and are not peer reviewed. The third publication (Brooks et al., 2009) is in a psychology journal but is a review article and not a research study. I have reviewed these publications and none focuses on the evaluation of older individuals with dementia and none of these publications provides a description of the algorithm used in the proposed Settlement.

17. The individuals who authored these publications are well-respected in the field of neuropsychological assessment and psychometrics. In fact, I have published a chapter in a Neuropsychology Handbook with Drs. Iverson and Brooks about the *Neuropsychological Assessment Battery* (NAB), a battery of 33 neurocognitive tests that I created (with Dr. Travis White), funded, in part, by the NIH, and which took 7 ½ years to develop. A review of each of the primary authors’ (Holdnack, Brooks, Iverson) online biographies, however, shows that they do not specialize in dementia or neurodegenerative disease.

IV. CO-LEAD CLASS COUNSEL SELECTIVELY QUOTED MY WRITINGS AT THE FAIRNESS HEARING

18. I attended the November 19, 2014 fairness hearing and listened to the arguments of Class Counsel, Counsel for the NFL Parties, and various counsel for Objectors. I have also reviewed the relevant portions of the transcript from that hearing.

19. During his rebuttal argument, Mr. Seeger quoted from several of my scholarly publications and suggested that my academic writings undermine or contradict the opinions I expressed in my October 6 Declaration. The opinions I expressed in my October 6 declaration are entirely consistent with my body of academic research.

20. First, Mr. Seeger quoted me as writing that “there is no epidemiological cross-sectional prospective studies of CTE that currently exist.” I did not, however, suggest otherwise in my October 6 Declaration. In focusing on the absence of prospective studies, Mr. Seeger ignores the significance of the retrospective studies that have been performed. Those studies have generated a consensus in the scientific JA4596

community that repetitive head trauma is a necessary condition for developing CTE. That is, in the absence of repetitive head trauma, an individual will not develop CTE. Since the 1970s, every case of neuropathologically confirmed CTE (nearly 200) has been found in an individual who sustained repetitive head trauma. No case of neuropathologically confirmed CTE has yet been identified in an individual who has not sustained repetitive head trauma.

21. Second, Mr. Seeger quotes a 2014 article of mine that states: “There are no objective validated *in vivo* biomarkers of CTE.” Again, my October 6 declaration does not state otherwise. Rather, I noted that tests for such biomarkers would likely be available within 5 to 10 years, and that those tests could be combined with clinical examination to produce a highly accurate, clinically accepted, and FDA-approved method of diagnosing CTE during life.

22. Finally, Mr. Seeger quotes me as writing that “although a history of remote head trauma may be suggested of CTE, head trauma has been implicated as a risk factor for Alzheimer’s, Parkinson’s disease, ALS and other neurodegenerative diseases.” Even though head trauma has been implicated as a risk factor for Alzheimer’s, Parkinson’s, ALS, and other neurodegenerative diseases, it is *also* a risk factor for CTE. And, importantly, of the neurodegenerative diseases for which head trauma is a risk factor, CTE is the *only* disease that requires head trauma as a necessary condition. In contrast to CTE, each of the other neurodegenerative diseases is found in individuals who have not suffered repetitive brain trauma.

Pursuant to 28 U.S.C. § 1746, I state under penalty of perjury that the foregoing is true and correct:



Robert A. Stern, Ph.D.

Date: November 30, 2014

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA

IN RE: NATIONAL FOOTBALL LEAGUE
PLAYERS' CONCUSSION INJURY
LITIGATION

Kevin Turner and Shawn Wooden,
*on behalf of themselves and
others similarly situated,*

Plaintiffs,

v.

National Football League and
NFL Properties, LLC,
successor-in-interest to
NFL Properties, Inc.,

Defendants.

THIS DOCUMENT RELATES TO:
ALL ACTIONS

SUPPLEMENTAL DECLARATION OF SAM GANDY, M.D., PH.D.

Sam Gandy, M.D., Ph.D., affirms under penalty of perjury the truth of the following facts:

1. I am the Mount Sinai Professor of Alzheimer's Disease Research, Professor of Neurology and Psychiatry, Associate Director of the Mount Sinai Alzheimer's Disease Research Center in New York City, and Chairman Emeritus of the National Medical and Scientific Advisory Council of the Alzheimer's Association.

2. On October 14, 2014, I submitted a declaration in support of the October 6, 2014 Objection of Sean Morey, Alan Faneca, Ben Hamilton, Robert Royal, Roderick Cartwright, Jeff Rohrer, and Sean Considine. See Dkt. No. 6232-1. I reaffirm the statements made in that Declaration.

3. I did not receive any financial compensation from any source, including any plaintiffs' lawyer in this case, for preparing this Supplemental Declaration.

4. I understand that on November 19, 2014, the Court held a fairness hearing during which attorneys for the NFL, the plaintiff class, and various objectors presented argument on the fairness, adequacy, and reasonableness of the Settlement.

5. I also understand that during those arguments, Co-Lead Class Counsel Christopher Seeger responded to my October 14 declaration. I have reviewed the transcript of the statements Mr. Seeger made about me and my research during the fairness hearing.

6. At the fairness hearing, Mr. Seeger quoted me as writing that "there have been no prospective studies and clinical and neuropsychological characterization of CTE is yet to be properly developed." *See* Tr. 195:6-9. That quote is taken from an article I authored with others in *Molecular Neurodegeneration* entitled "Chronic Traumatic Encephalopathy: Clinical-Biomarker Correlations and Current Concepts in Pathogenesis." That article is attached as Exhibit A. Nothing in that article undermines or contradicts the statements in my October 14 declaration.

7. Mr. Seeger pulls this quote out of context and ignores what *is known* about CTE.

8. First, that statement notes only the present absence of widely accepted criteria for making a *clinical* diagnosis of CTE. A clinical diagnosis or a clinically accepted diagnosis is a diagnosis of CTE in a living person made by a clinician.

9. A neuropathological diagnosis, by contrast, is made by examining the brain tissue of an individual post-mortem. A neuropathological diagnosis of CTE is currently available and is widely accepted and recognized in the medical and scientific community as a valid diagnosis. The neuropathology associated with CTE is unique and distinct from the neuropathology of other

neurodegenerative diseases. As I wrote, “in the 21st century, the challenge is no longer the acceptance of the entity of CTE but rather a sorely needed accounting of the actual numbers of affected persons as well as the numbers of those who remain unaffected despite exposure to the identical repetitive head traumas.” Ex. A at 2.

10. Second, although there currently are no *in vivo* biomarkers that can be used to reliably diagnose CTE, “PET imaging ligands are now in development for the detection of abnormally phosphorylated tau associated with [the] neurofibrillary tangles” that are characteristic of CTE. Ex. A at 16. A PET imaging ligand is a molecule that binds to a certain protein in the body, in this case phosphorylated tau. The ligand is detectable using a PET scan and thus allows physicians and researchers to image the pattern and location of the protein in the body. Indeed, recent reports suggest that one such PET imaging ligand—T807—has been successfully employed for the detection of CTE tauopathy *in vitro* and *in vivo*. Ex. A at 17. It is only a matter of time before this ligand, and others like it, will be sufficiently developed that they can be used in conjunction with clinical diagnostic criteria to render a reliable clinical diagnosis of CTE in the living.

11. I have reviewed the declarations of Drs. Bernick, DeKosky, Hof, Shenton, Stone, Weiner, Wisniewski, and Zhang. Each of those experts stated that a “clinically accepted diagnosis of CTE” will likely be possible within ten years and will be possible before the expiration of the Settlement term. I understand – as would any expert in the field, including the declarants named above – that a “clinically accepted diagnosis” is a diagnosis in a living person.

12. Mr. Seeger also attributed to me the remark that “we have little idea, however, of the risk of developing CTE following [traumatic] brain injury.” *See* Tr. 196:11-16. That quote is taken from an article on which I was listed as a co-author. The article appeared in in the

journal *Nature Review Neurology* and is titled “Acute and Chronic Traumatic Encephalopathies: Pathogenesis and Biomarkers.” That article is attached as Exhibit B. Nothing in that article undermines or contradicts the statements in my October 14 declaration.

13. Again, Mr. Seeger takes this quote out of context and ignores what *is known* about CTE.

14. Repetitive brain trauma is a *necessary condition* for developing CTE; in the absence of repetitive brain trauma, an individual will not develop CTE. There is “definitive documentation that progressive neurodegeneration . . . was associated with elective exposure to repetitive head trauma.” Ex. A at 1. And in nearly 200 cases of neuropathologically confirmed CTE, *every case* has occurred in an individual who experienced repetitive brain trauma. Indeed, CTE has not yet been found outside the population of individuals exposed to repetitive brain trauma.

15. There is also an “increasingly evident association of CTE with American football” and the disease “has also been associated with other high impact sports (soccer, hockey) and with exposure to improvised explosive devices (IEDs) in the battlefields of Iraq and Afghanistan.” Ex. A at 2; Ex. B at 5. In fact, I find this association sufficiently strong that I believe informed consent protocols should be developed and required of individuals contemplating exposure to repetitive TBI.

Pursuant to 28 U.S.C. § 1746, I state under penalty of perjury that the foregoing is true and correct.

Dated: December 2, 2014

Sam Gandy, M.D., Ph.D.

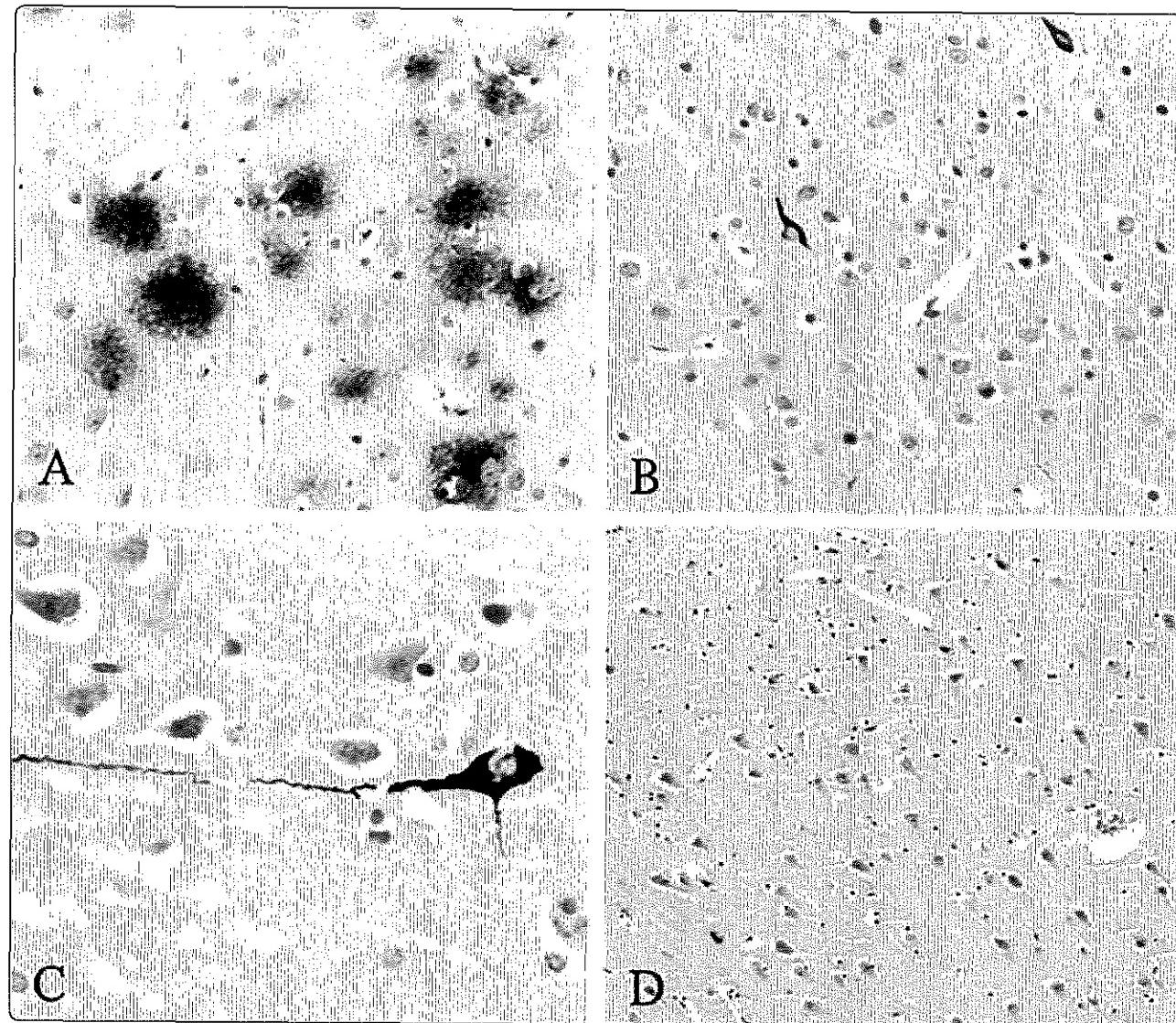
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Exhibit A



Chronic traumatic encephalopathy: clinical-biomarker correlations and current concepts in pathogenesis

Gandy *et al.*



REVIEW

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Chronic traumatic encephalopathy: clinical-biomarker correlations and current concepts in pathogenesis

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Abstract

Background: Chronic traumatic encephalopathy (CTE) is a recently revived term used to describe a neurodegenerative process that occurs as a long term complication of repetitive mild traumatic brain injury (TBI). Corsellis provided one of the classic descriptions of CTE in boxers under the name "dementia pugilistica" (DP). Much recent attention has been drawn to the apparent association of CTE with contact sports (football, soccer, hockey) and with frequent battlefield exposure to blast waves generated by improvised explosive devices (IEDs). Recently, a promising serum biomarker has been identified by measurement of serum levels of the neuronal microtubule associated protein tau. New positron emission tomography (PET) ligands (e.g., [¹⁸F] T807) that identify brain tauopathy have been successfully deployed for the *in vitro* and *in vivo* detection of presumptive tauopathy in the brains of subjects with clinically probable CTE.

Methods: Major academic and lay publications on DP/CTE were reviewed beginning with the 1928 paper describing the initial use of the term CTE by Martland.

Results: The major current concepts in the neurological, psychiatric, neuropsychological, neuroimaging, and body fluid biomarker science of DP/CTE have been summarized. Newer achievements, such as serum tau and [¹⁸F] T807 tauopathy imaging, are also introduced and their significance has been explained.

Conclusion: Recent advances in the science of DP/CTE hold promise for elucidating a long sought accurate determination of the true prevalence of CTE. This information holds potentially important public health implications for estimating the risk of contact sports in inflicting permanent and/or progressive brain damage on children, adolescents, and adults.

Overview

Chronic traumatic encephalopathy (CTE) is unique among brain diseases in having a history of decades of organized opposition to its codification as an authentic or valid entity. The conceptual entity has evolved over the 75 years since Harrison Stanford Martland [1], writing in *The Journal of the American Medical Association* in 1928, coined the term "punch drunk" to describe the tremors and

impaired cognition that affected some boxers [1]. In 1937, Millspaugh [2] coined the term "dementia pugilistica" (DP), which was broadened to "chronic traumatic encephalopathy" (CTE) by Macdonald Critchley [3] in 1949. In 1973, John Corsellis and colleagues [4] brought DP/CTE into the modern day with their definitive documentation that progressive neurodegeneration (Figures 1 and 2) was associated with elective exposure to repetitive head trauma. This report set off a controversy that continues today regarding the role of society in regulating intentional head injury and in establishing the liability of organizations that encourage such exposure with little in the way of informed consent.

Despite condemnation of boxing by the American Medical Association [6] and by the American Pediatrics

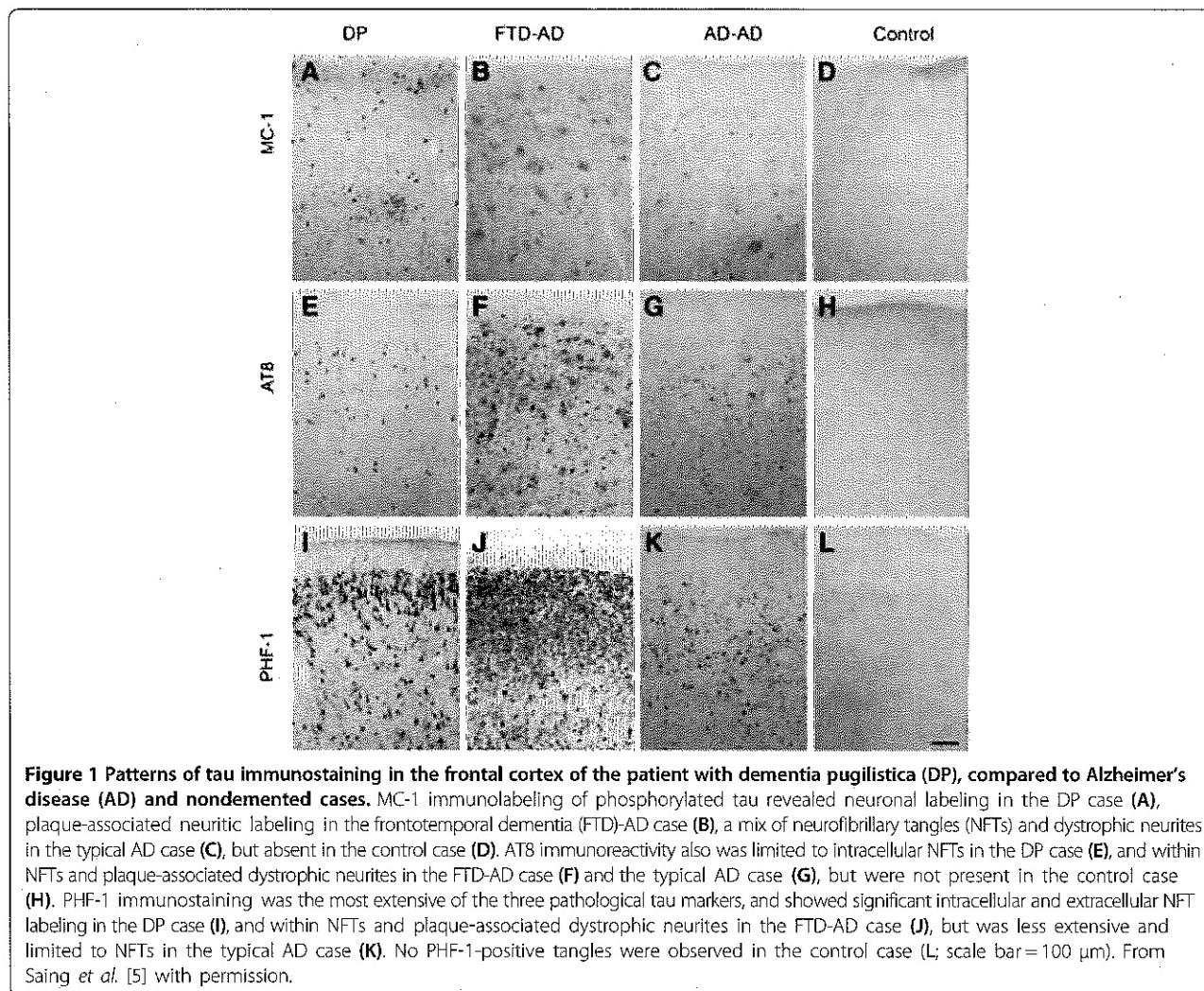
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Association [7] in 1997 and predictions of the rapid demise of boxing, the sport continues today, and multi-million dollar purses still await the winners. In turn, the chance to compete for these purses continues to attract new boxers into professional associations, fueling the sport. Other sports associated with repetitive head trauma (e.g., ultimate fighting and mixed martial arts) have expanded and found larger participant groups and fans. Despite much social opposition to these sports, all efforts at boxing bans have so far been stymied by the influence of pro-boxing lobbyists on state and federal legislatures [8]. While over 50 sports-associated cases of CTE have been reported [9], efforts at educating the public regarding the risks of repetitive head injury are hindered by some retired boxing champions who refuse to recognize that their own brain disease is due to their chronic exposure to boxing. Newer "sports" involving various forms of fighting provide further encouragement.

In 2005, Omalu and colleagues [10] revived the term CTE in their report of the index case of a retired

National Football (NFL) player with progressive neurological dysfunction (Figure 3). The term CTE includes DP and supplants the use of the term DP. With the increasingly evident association of CTE with American football, the stakes grew exponentially. In part as a result of the NFL's consistent denial of the danger of CTE to its players, in both public statements and legal challenge statements, the disease remained out of the spotlight until the League aligned itself with the independent and academic experts who were studying the disease [11]. CTE has also been associated with other high impact sports (soccer, hockey) and with exposure to improvised explosive devices (IEDs) in the battlefields of Iraq and Afghanistan [12-14] (Figure 4). Now, in the 21st century, the challenge is no longer the acceptance of the entity of CTE but rather a sorely needed accounting of the actual numbers of affected persons as well as the numbers of those who remain unaffected despite exposure to the identical repetitive head traumas. The role of aging has also gone unexplored. With those numbers in hand, we

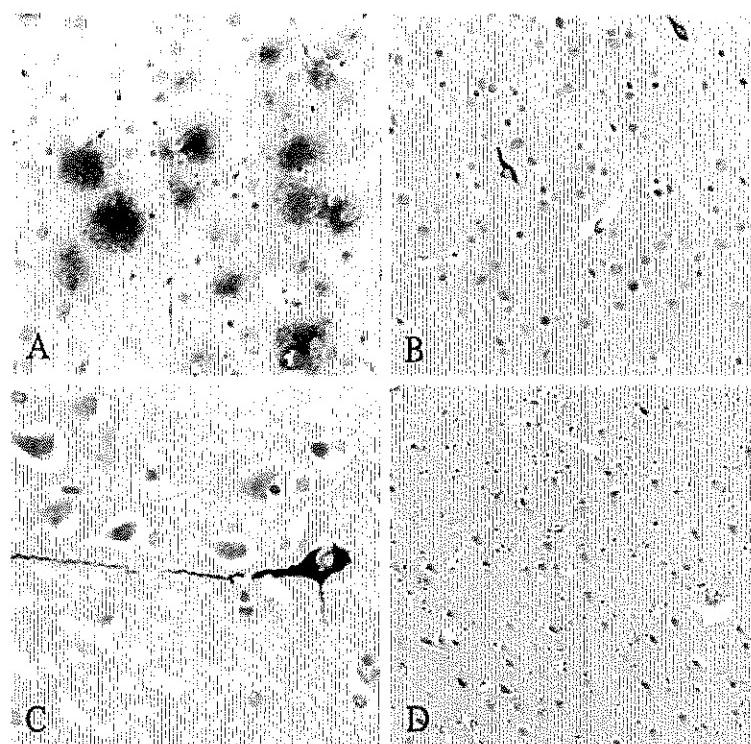


Figure 3 Micrographs from the index case of CTE in an American football player. Panel A, β-amyloid immunostain of the neocortex (original magnification, $\times 200$) showing frequent diffuse amyloid plaques. Panel B, tau immunostain of the neocortex (original magnification, $\times 200$) showing sparse NFTs and many tau-positive neuritic threads. Panel C, tau immunostain (original magnification, $\times 400$) showing an NFT in a neocortical neuron with extending tau-positive dendritic processes. Panel D, β-amyloid immunostain (original magnification, $\times 100$) of the Sommer's sector (CA-1 region of the hippocampus) showing no diffuse amyloid plaques. From Omalu et al. [10] with permission.

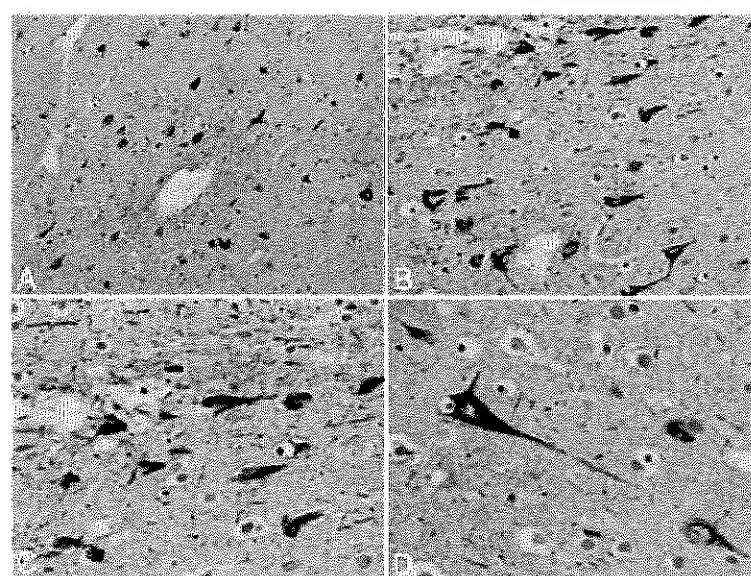


Figure 4 The index case of military CTE. Photomicrographs of tau-immunostained section of the frontal cortex showing frequent neurofibrillary tangles and neuritic threads (A and B), with higher magnification (C and D) showing band- and flame-shaped neurofibrillary tangles and neuropil neuritic threads. Original magnification $\times 200$ (A), $\times 400$ (B), $\times 600$ (C and D). From Omalu et al. [15] with permission.

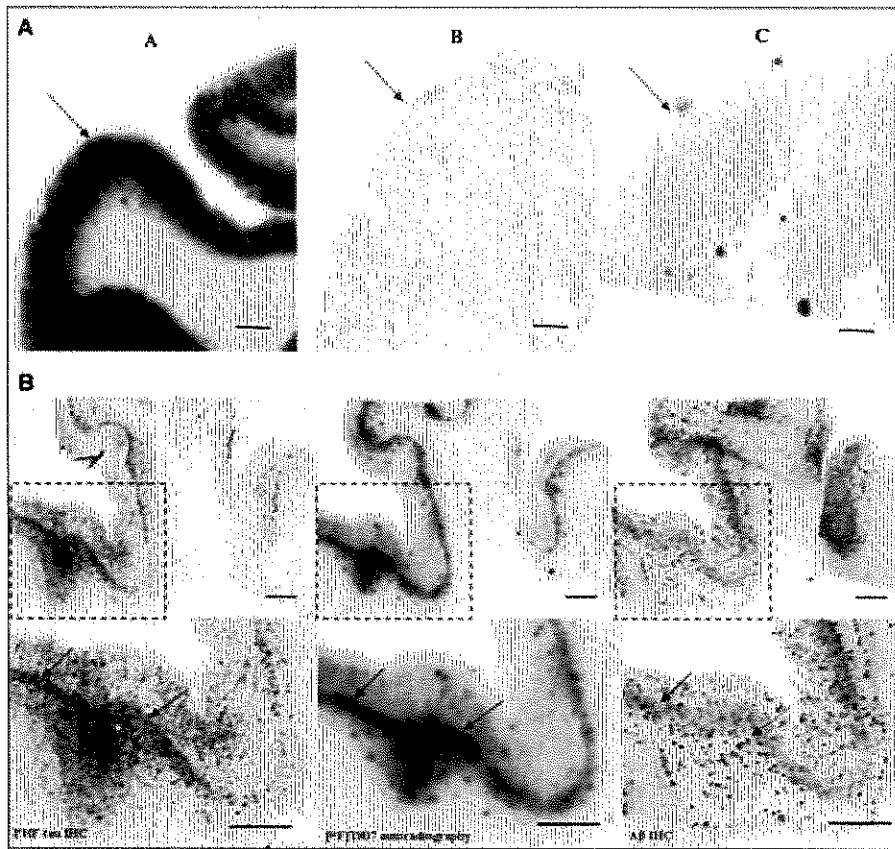


Figure 5 [18 F] T807 autoradiography on brain sections and its comparison with paired helical filament (PHF)-tau and amyloid beta (Aβ) double immunohistochemistry (IHC). (A) Representative images for [18 F] T807 autoradiographs from groups A, B, and C of brains ([18 F] T807 autoradiography, 20 µCi/section). Positive autoradiography signals were observed only in the gray matter of brain from the PHF tau rich group A. Arrows indicate gray matter. (B) [18 F] T807 colocalized with PHF-tau but not with Aβ plaques. (B, top row) Low magnification. (B, bottom row) High magnification from the framed areas. Images of PHF tau (left) and Aβ (right) IHC double immunostaining and autoradiogram image (middle) from two adjacent sections (10 µm) from a PHF-tau rich group A brain (frontal lobe). Positive [18 F] T807 labeling colocalized with immunostaining of PHF tau but not with Aβ plaques, as indicated by arrows. Fluorescent and autoradiographic images were obtained using a Fuji Film FLA-7000 imaging instrument. Scale bars = 2 mm. From Xia et al. [19] with permission.

from the study of boxers and, more recently, football players, athletes from other contact sports, as well as those exposed to domestic violence, and military personnel exposed to battlefield blast injuries [20,21]. However, there have been no prospective studies linking clinical phenotypes during life (including neuropsychological function and outcome) with autopsy-confirmed CTE. Thus, the clinical and neuropsychological characterization of CTE is yet to be properly developed. The development of biomarkers for CTE (reviewed in detail below) should greatly facilitate the fulfillment of this goal.

In their review of 48 cases of neuropathologically confirmed CTE, McKee et al. [21] found that memory loss was reported in over half of the individuals. As in AD, loss of insight often precluded patients from recognizing their deficits, and this important piece of the presentation was derived from friends or family. Other studies have reported that impairment in executive function is common

in neuropathologically confirmed CTE [22]. Executive functions are a collective set of higher order abilities (judgment, self-inhibitory behaviors, decision-making, planning and organization) considered to be primarily dependent upon adequate functioning of the frontal lobes of the brain. Damage to various regions of the frontal cortex can disrupt these higher order abilities, leading to poor impulse control, and socially inappropriate, avolitional, and apathetic behaviors. For example, damage to the orbitofrontal regions can result in significant changes in personality. Thus, changes in personality, apathy, impulsivity, aggression, and "short fuse" behaviors typical of CTE [23] are consistent with the atrophy and other neuropathological changes of the frontal lobes that have been described in nearly all reported cases of CTE [16,21-24].

Neuropsychological, mood, and neurobehavioral dysfunction in CTE typically presents in midlife after a latency period, usually years or decades after exposure to the

repetitive trauma. The cognitive and behavioral symptoms of CTE begin insidiously, followed by progressive and gradual deterioration. Mood symptoms are typically depression, apathy, irritability, and suicidality. Behavior symptoms are impulse control, disinhibition, and aggression as well as comorbid substance abuse [24]. The continued degeneration of brain regions most severely affected in CTE (cerebral cortices, hippocampi, amygdalae, basal forebrain, mammillary bodies) results in the worsening of behavioral and mood symptoms, and the further deterioration of cognitive abilities subserved by these regions. Baugh *et al.* [24] organized the neuropsychological and neuropsychiatric symptoms of CTE into the categories of cognition, mood, and behavior. As mentioned, the early cognitive symptoms of CTE involve memory impairment and executive dysfunction. The early involvement of hippocampal-entorhinal cortices and medial thalamic circuits may explain the memory impairment and its similarity to the memory loss associated with AD. As in AD, the genetic risk posed by apolipoprotein E ε4 (*APOE* ε4) may play a role in the dementia associated with CTE [25-27]. The dysexecutive syndrome in CTE may result from the early neurofibrillary degeneration of the frontal cortex [10,21,22]. As the disease progresses, there is worsening memory impairment and executive dysfunction, language problems, motor dysfunction, aggression (physical as well as verbal), and apathy [23]. Dementia is evident in most CTE individuals who live to be over the age of 65 years [24]. However, the high rates of suicides, accidents, and drug overdoses often lead to death prior to this age [10,28]. As a result, most persons with neuropathologically confirmed CTE were not demented at the time of death. In view of the young age of onset as compared with AD, CTE may be misdiagnosed as the behavioral variant of FTD. However, CTE has a more gradual and prolonged progression than does FTD, and CTE is associated with a repetitive TBI history but with no family history [24].

Neuropsychological testing may be valuable in scientific studies on TBI in both the acute and chronic phases. Athletes and military combatants exposed to multiple blast events are at highest risk for sustaining multiple mild TBI or concussions and potentially developing CTE. In order to appreciate fully the effects of single and multiple concussive and sub-concussive brain injuries and to enable tracking of recovery in individual cases, brief baseline and serial post-concussion neurocognitive assessments, based upon the Sports as a Laboratory Assessment Model (SLAM) methodology, are the recommended standard of practice [29]. Key neurocognitive elements of these abbreviated assessments include attention, processing speed, reaction time, and learning and memory.

Once CTE is suspected, based upon a history of repeated trauma and presence of cognitive and/or behavioral impair-

ment, scientific studies are needed to evaluate the value of comprehensive neuropsychological testing; e.g., assessment of general verbal and visuospatial problem solving, language fluency, attention, learning and memory, speed of mental processing, abstract reasoning, judgment, new problem solving, planning and organization, mental flexibility, sensory and motor intactness, and emotional/psychological and behavioral functioning. A recent cross-sectional study assessed cognitive impairment and depression, as well as the neuroimaging correlates of these dysfunctions, in former NFL players [30]. Former NFL players with cognitive impairment and depression were compared to cognitively normal retired players who were not depressed, and a group of matched, healthy control subjects. The cognitive deficits found were primarily in naming, word-finding, and memory (verbal and visual) and were associated with disrupted white matter integrity on DTI and changes in regional cerebral blood flow. Although none of the players fit the clinical profile of CTE per se, the sample size was very small. Nevertheless, this is one of the first studies examining the neural correlates of cognitive dysfunction and depression in players with a history of concussions (range 1–13 concussions in this sample).

Neuropathological changes in boxers (dementia pugilistica, punch-drunk syndrome)

For this section, the combined term DP/CTE is employed, since the term DP appears in this original literature. However, the revival of the term CTE was intended to include DP and to supplant the use of the term DP. In 1934, Parker described three cases of boxers affected with the illness [31] and drew attention to the risk of developing DP/CTE in professional boxing. Neuropathological examination of these retired professional boxers' brains demonstrated that the primary DP/CTE lesion involved multifocal intracellular aggregates of hyperphosphorylated tau, which resembled the neurofibrillary tangles (NFT) found in AD brains [32]. Using Congo red and silver staining, Corsellis and colleagues studied 15 cases of DP/CTE and confirmed the abundance of NFT. Like the NFT of AD, the NFT of DP/CTE is also reactive to antibodies to other AD-related proteins such as ubiquitin [33] and Aβ [34]. The anatomical patterns of NFT distribution are different in DP/CTE and AD: there is greater involvement of superficial layers of the associational neocortex in cases with DP/CTE and notably in the depths of cortical sulci [35]. This difference may reflect a unique way in which NFT are formed and propagated in DP/CTE.

In clear distinction to neuropathologically confirmed AD, no congophilic or argyrophilic plaques were observed in the Corsellis study [32]. In 1991, other investigators re-examined 14 out of the original 15 DP/CTE cases from the Corsellis study as well as additional brains of professional and amateur boxers, using Aβ immunohistochemistry and formic acid pre-treatment of tissue

sections [34,36-38]. Re-examination revealed that these 14 brains with NFT pathology (and even two amateur fighters' brains that lacked NFT) also had A β -immunoreactive plaques [34,36-38]. These DP/CTE plaques were described as diffuse in most cases; they lacked both Congo red positivity and the silver-positive dystrophic neurites that are typical of mature AD plaques. Some cases also displayed cerebrovascular deposits of A β . These data demonstrated that DP/CTE is associated with both the NFT and A β -related AD-like pathology. The antigenic similarities of neurofibrillary lesions in DP and AD led Roberts to suggest that the two conditions likely share the same pathogenesis and that TBI may be a risk factor for developing AD [37].

More recent studies reconfirmed that DP/CTE includes both NFT and A β pathology. Tokuda *et al.* [38] and Nowak *et al.* [39] examined the brains of boxers who suffered a progressive cognitive decline before death, and reported NFT as well as infrequent neuritic A β plaques. McKee and colleagues [21] studied two aged (80 and 73 years) professional boxers and presented them along with 37 previously published cases of boxers with neuropathologically verified DP/CTE. Similar to earlier reports, the most striking pathological feature in these two cases involved multifocal patches of neuronal and astrocytic NFT in superficial cortical layers, most frequently at the depths of the sulci and around large blood vessels [21]. In one of the two boxers, there were moderate diffuse A β plaques and sparse neuritic plaques in several neocortical regions. Collectively, these reports indicate that the neuropathology of DP/CTE was heterogeneous and involves both NFT and diffuse A β deposits, although the extent and proportions of these lesions vary from case to case and may be influenced by other factors such as number of years since TBI, age at the time of the TBI, and genetic predisposition. In a study by Geddes and colleagues, the brain of a 23-year-old boxer was found to have all neocortical areas affected with NFT; however no other changes (including A β deposits) were reported [40]. APOE $\epsilon 4$ alleles have been associated with more severe cognitive deficits in boxers [25] and could contribute to more severe A β pathology, as has been demonstrated in AD. In an APOE $\epsilon 4$ heterozygous retired boxer with DP/CTE, death was caused by hemorrhage due to amyloid angiopathy [41]. Clinical misdiagnosis of DP/CTE as AD is not unusual; interestingly, both boxers in the McKee report were diagnosed with AD during life. Differential diagnosis is likely to be clarified with amyloid imaging. We reported a case report illustrating this wherein the clinical diagnosis of retired NFL player could not be resolved until florbetapir imaging excluded the diagnosis of AD [42].

Other common findings in DP/CTE include cerebral infarcts and fenestrated cavum septum pellucidum (CSP) as well as substantia nigra degeneration [28]. Changes in substantia nigra could explain the increased incidence of

Parkinsonism in retired boxers. It had been proposed that identification of CSP on CT scans could be of a diagnostic value for DP/CTE [43]. However this pathological feature is not consistently present [44], possibly because of the high prevalence of CSP in both boxers and non-boxers [45]. Because of the rigid enclosure of the brain inside the calvarium, acceleration-deceleration injuries associated with boxing often involve cerebral and meningeal vascular damage, the most common of which is subdural hematoma and to a lesser extent epidural, subarachnoid, and/or intraparenchymal hemorrhages [46]. Neuropathological sequelae of boxing appear to be less severe in amateur boxers, likely due to better-implemented regulations, fewer total bouts, and other measures of protection. In retired professional boxers, however, the risk of developing DP/CTE is greater: the extent of neurological abnormalities defined by CT and EEG, and severity of DP/CTE symptoms, correlated with numbers of fights and overall duration of boxers' career [25,47,48].

Not shown here are some other CTE-associated structures described by McKee [21] including astrocytic tangles, perivascular tau pathology, or patchy tau pathology. An important significance for these structures is that McKee uses their presence to differentiate CTE from AD. The reader is referred to [21] for typical images of those structures.

Neuropathological changes associated with American football

In contrast to the neurodegenerative changes associated with professional boxing, the chronic neuropathological sequelae of repetitive hits to the head in American football and other contact sports (hockey, rugby, etc.) have only been recognized more recently. Impacts to the head in American football cause less rotational acceleration than those suffered in boxing [49]; football-related injuries are of a translational acceleration-deceleration type, and despite the use of helmets, they can result in concussions or unconsciousness. In 2005, Omalu and colleagues reported the first neuropathology finding of CTE in a 50-year old retired NFL player [10]. In this case, they described AD-like changes that consisted of neocortical A β -immunoreactive plaques and sparse tau-immunoreactive neuronal and axonal aggregates resembling NFT and neuropil threads. While coexistence of A β plaques and NFT might have suggested an ongoing AD process, several observations argued against this idea: 1) there was no family history of AD; 2) at autopsy, the brain had no signs of cortical atrophy or overt neuronal loss; 3) the neocortical A β -immunoreactive plaques were numerous, but were diffuse (non-neuritic); and 4) NFT were scarce in the neocortex and absent in the entorhinal cortex and hippocampus which is the initial focus of NFT development in AD, prior to any cortical NFT [50]. The neuropathological pattern consisting of diffuse neocortical A β plaques and scarce

NFT was similar to changes described in subjects with acute severe TBI [51] or in cases with preclinical AD, suggesting that both mild repetitive and severe brain injuries may initiate early AD-like changes. The second case reported by Omalu and colleagues [52] was a 45-year old retired NFL player who had numerous cortical and subcortical tau-immunoreactive NFT and neuropil threads, but no A β -immunoreactive plaques. In a more recent study, McKee and colleagues [21] described CTE in a 45-year old retired football player and compared their findings to previous neuropathology reports in four players who had played similar positions during their career. Tau-immunoreactive NFT-like neuronal and glial (fibrillar astrocytic) profiles and thread-like neuropil neurites were frequent in multiple cortical regions, predominantly occupying deep sulcal and perivascular locations [21]. NFT were also abundant in the entorhinal cortex, hippocampus, amygdala, nucleus basalis and septal nuclei, hypothalamus, thalamus, striatum, and olfactory bulb. Diffuse A β plaques were reported in 3 of the 5 cases [21]. As in CTE due to boxing (i.e., DP), there are similarities of the effects of football injuries to AD and other neurodegenerative disorders, notably involving NFT and diffuse A β deposition, and these findings require further investigation.

Neuropathological changes associated with battlefield blast exposure

Studies of military servicemen who participated in recent wars indicate that repetitive mild head injury and concussions due to blast (explosive) injury might also result in CTE. This literature is the least mature since the index case of military CTE was only reported by Omalu a few years ago [15]. Brody and colleagues used diffusion tensor imaging (DTI) to evaluate the extent of axonal injury in 63 U.S. military personnel diagnosed with mild TBI after blast exposure with secondary mechanical injuries [53]. They found that, in these subjects, TBI was associated with significant axonal injury, which was still present 6–12 months later at follow up evaluation with DTI. Diffuse loss of white matter integrity was also detected using high angular resolution diffusion imaging (HARDI) in military veterans from Iraq and Afghanistan who had been diagnosed with mild TBI and comorbid PTSD [54]. Collectively, these findings indicate that TBI associated with blast or chronic mild injury produces chronic neuronal damage. Blast injuries and closed head injuries have similar clinical features [55], however, the extent of neurological damage in blast injured veterans is likely influenced by injuries of other systems, since air-filled organs (including lungs) are often severely affected [56,57].

Goldstein [58] and colleagues performed postmortem analyses of brain tissues from four military veterans who were exposed to blast or concussive injury and compared them to four professional athletes who suffered repetitive

concussions. In the neocortex from military veterans, there were frequent perivascular and deep sulcal accumulations of NFT-like tau-positive neurons and glial cells as well as dystrophic axons were reported [58]. Subcortical white matter in close proximity to these lesions had dystrophic axonal changes and clusters of activated microglia were described. These pathological changes were similar to those observed in sports CTE. The findings in this study have been challenged because all military CTE subjects had histories of *both* civilian and military TBI, making it impossible to distinguish which lesions arose from which injuries. Similar tau-immunoreactive neuropathological features were described in an Iraqi war veteran with PTSD who had been exposed to multiple blast explosions during his deployments [15]. These autopsy studies of brains from blast-injured veterans are not in agreement with recent body fluid biomarker analyses in soldiers exposed to blast [53], emphasizing both the variability of such injuries and the variability in the accuracy of the historical details surrounding the injuries. In this study of Army officers exposed to different levels of blast overpressure by firing heavy weapons, Blennow and colleagues [59] measured CSF biomarkers of neuronal injury (tau and neurofilament protein) or glial injury (GFAP and S-100 β) as well as CSF/serum albumin ratio, hemoglobin, and bilirubin content in CSF. GFAP and S-100 β were also analyzed in serum samples. All analyses indicated normal levels of examined markers, leading the authors to conclude that high-impact blast was not associated with biomarker evidence of brain damage [59]. The discrepancy between this report and published evidence of neuropathology in blast injured servicemen warrants further investigation, and the issue of whether the blast wave itself causes injury remains open. Another possible explanation is the lag time between injury and serum sampling. Both [53] and [59] illustrate the discrepancy between neuropathology that can be static and long-lasting vs serum biomarkers that will rise acutely and then fall as the marker molecule is cleared. Recent studies of serum tau as a marker of acute TBI in hockey players showed surprisingly good correlation with outcome [60].

Molecular pathogenesis of CTE

As noted above, CTE is considered to be primarily a tauopathy with frequent coexistence of A β pathology. Notably acute severe TBI is associated with diffuse A β plaques and minimal tau pathology [51]. Other types of abnormal protein aggregates are less common in CTE; for example, alpha-synuclein immunoreactive inclusions were not reported in any of 51 CTE cases reported by McKee and colleagues [21]; however, they were detected only following acute severe TBI [51]. Multiple cases of Parkinsonism have been reported in professional boxers, and there is increased prevalence of ALS in professional football [61] and soccer players [62].

The detailed molecular pathogenesis of CTE is unknown. As observed in cases with single severe head trauma, axonal injury occurs in CTE, and this may be responsible for accumulation of phosphorylated tau. Tau is a microtubule-associate protein which can undergo excessive phosphorylation in the pathological milieu of brain injury associated with ischemic foci that increase the risk of damage from oxidative stress. The idea of ischemic changes as a contributing factor to tau hyperphosphorylation and formation of NFT-like changes in CTE is consistent with their preferential deep sulcal and perivascular localization. Because both neuronal and astrocytic NFT are observed in these areas, it is possible that changes in tau are related to a more general injury response mechanism that is not injury-specific or cell-specific (e.g., brain ischemia, inflammatory reaction).

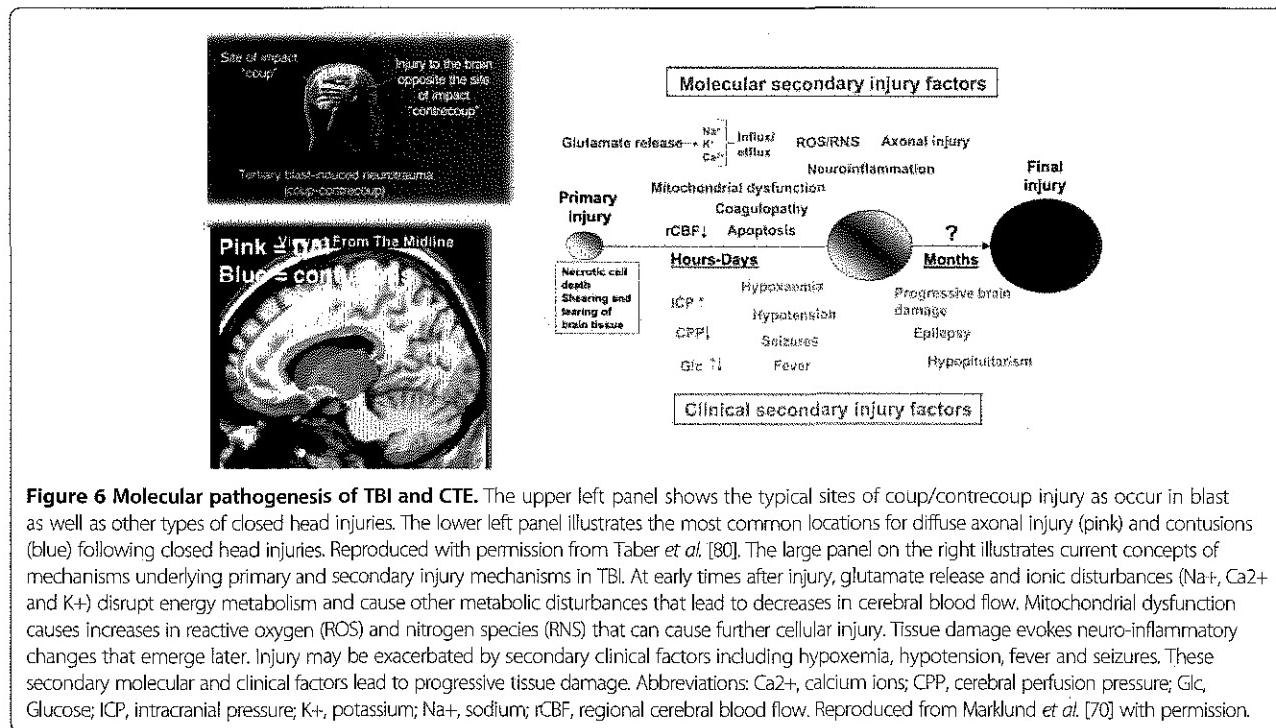
Diffuse axonal injury (DAI) is the most consistently reported neuropathological feature following acute head trauma [63]. DAI is associated with intra-axonal accumulation of tau, A β -precursor protein (APP), ubiquitin, and α -synuclein [64,65]. As an acute reaction to TBI, there is an upregulation of APP and/or a switch in its metabolic processing resulting in increased concentrations of A β , which can deposit in diffuse, predominantly A β 42, plaques both acutely after severe TBI [51] and chronically in boxers with DP/CTE. In studies of both autopsy cases and in surgical biopsy tissue from subjects with TBI [51], about 30% of acute severe TBI patients are reported to show evidence of A β plaques. A β deposits in CTE have received less attention in the literature than has the tauopathy; however these changes may have a significant role. The development of A β lesions may depend on age of the subject, time interval since the head injury, and genetic factors. More extensive and mature A β pathology (i.e., neuritic plaques) may be absent, or may recede over years, in subjects with protective genetic factors that can result in better degradation/clearance of A β from the brain [66,67], while tau-related pathology may develop more slowly, may be more resistant to degradation and therefore observed at late stages of disease. Other genetic factors (*APOE4*) may influence A β pathology. The link of *APOE e4* to dementia in CTE is unexpected on the basis of tauopathy, since *APOE e4* modulates A β pathology in AD but not tauopathy. Perhaps *APOE e4* modulates the severity of the acute A β deposition which, in turn, affects clinical severity. This is a key point in determining which types of interventions will be most promising and at what point in pathogenesis each is most likely to be successful. Recent evidence that chronic action of interleukin-1 β can reduce amyloidosis while exacerbating tauopathy raises the possibility that this neurodegeneration-associated cytokine may drive the conversion of acute post-traumatic A β deposition to chronic tauopathy with only minimal or inconsistent A β residua [68].

Alternatively, the extent and type of neuropathology changes in CTE resulting from different contact sports may reflect differences in the biomechanics associated with head injury, including impact level (force) and type of head movement (rotation, acceleration, deceleration). Novel genetic, biomarker, and neuroimaging analyses should be developed and employed for early detection of neuropathology, to provide a window of opportunity for preventing or at least delaying the clinical manifestations of neurodegenerative disease after TBI. Furthermore, timely identification of people at risk (e.g., *APOE e4* carriers) [27], and regular testing (imaging, CSF analyses, and detailed neuropsychological evaluation) should be considered essential.

Modeling CTE in laboratory animals

Currently there is no experimental animal model that recapitulates all pathophysiological aspects of human CTE. The best understood pathophysiological mechanisms associated acutely with severe blunt impact TBI are hemorrhage, mechanical tissue damage, and diffuse axonal injury (DAI) [69]. DAI results when angular forces cause shearing or stretching of axons; this can impair axonal transport which is manifested pathologically by focal axonal swellings, most commonly at gray/white matter junctions particularly in frontal and temporal cortical regions. Contusions occur as the result of coup/contre-coup injuries most commonly affecting the frontotemporal and occipital cortex. However not all injury occurs at the time of initial impact. Rather a complex cascade of pathophysiological effects unfolds over the ensuing hours and days following injury and results in further tissue damage [70] (Figure 6). Factors thought important in this secondary injury cascade include release of excitatory amino acids such as glutamate, calcium dyshomeostasis, mitochondrial dysfunction and oxidative stress. Increased glucose utilization at a time of decreased cerebral blood flow also likely exacerbates injury. While these molecular mechanisms are thought to be operative in moderate to severe TBI, there is much less in the way of neuropathological or molecular data on mild TBI and particularly from the mild repetitive concussions that contribute to CTE. What sets CTE apart from other injuries is a relentlessly progressive course leading to a syndrome that continues to progress even in the absence of further head trauma. Thorough understanding of this pathological transition in CTE would be facilitated greatly by an appropriate animal model.

Relevance of existing animal models of TBI to human CTE
Because of its potential clinical importance, animal modeling of TBI has been vigorously pursued and a number of methods have been developed that can induce focal, diffuse or mixed brain injury [70]. Most studies of TBI use rodents, but rabbits, pigs, cats, dogs, and nonhuman



primates have all been studied as well [69]. The choice of species has practical as well as theoretical implications. While rodents are less expensive than larger animals, their lissencephalic brains lack the structure of gyri and sulci found in humans. The white/grey matter ratio is also less in rodents compared to human brain; these anatomical factors may affect the biophysical properties of the brain's reaction to mechanical injury. Species such as pigs and non-human primates offer the advantage of having a brain more similar to humans, but their cost and in the case of non-human primates availability limit their wider use for TBI research.

To model various types of TBI in experimental animals, several methods have been developed [70]. Among the more widely used models, controlled cortical impact (CCI) produces focal contusions with pericontusional axonal injury while fluid percussion models produce more diffuse axonal injury. Weight drop methods can produce a range of injuries depending on the force applied (mass \times distance of the drop), and whether an open skull or closed skull technique is used. There has been recently increased interest in models of blast injury, due primarily to its importance in military head trauma [71]. Importantly, these models are associated with significant deficits in cognitive and motor function. In addition, anxiety and depression are common features of the post-concussion syndrome and evidence for impairment in both domains have been found as sequelae of TBI in some animal models [72]. There are several recognized limitations of the animal models. While human TBI

represents a heterogeneous injury, most animal models try to replicate more isolated pathological factors [69]. Human TBI is frequently accompanied by hypoxia, hypotension and ischemia, factors that are not prominent in many animal models [69]. Accordingly, TBI models can be utilized in combination with additional insults such as hemorrhagic shock which often accompanies blast TBI [71]. Another limitation of traditional TBI models in replicating CTE is that most produce relatively severe focal or diffuse damage that is more similar to the type of injury found in moderate to severe rather than mild TBI. Significant efforts have been made to adapt these models to produce effects of mild TBI. For example, the CCI device has been modified to deliver impacts to the intact mouse skull resulting in a more mild TBI-like outcome [73]. The weight drop technique has also been used to produce repetitive mild TBI in the mouse [74,75], and the lateral fluid percussion model has been modified to deliver milder injuries in the rat [76]. Additional models have been developed to mimic mild TBI in combat conditions including a closed-head projectile concussive impact in rats [77], and a model of blast induced repetitive mild TBI in the rat that has been found to induce chronic behavioral changes [78,79].

Animal models of single-episode TBI have been valuable in determining the time course and the extent of cytoskeletal derangements which are a key feature of CTE. In both humans and experimental animals, TBI-induced axonal damage is associated with extensive accumulation of multiple proteins [65,81]. Axonal microtubule and

neurofilament (NF) proteins are altered acutely after TBI [82], and they are more pronounced following moderate injury [83]. In pigs subjected to a rotational acceleration injury, diffuse axonal damage is characterized by co-accumulation of tau and A β together with NF and APP throughout the white matter, while in cortical regions phospho-tau aggregates appear in axonal bulbs as well as in structures resembling NFT [81]. Similar changes occur in rodent models of TBI in which alterations in tau and other microtubule associated proteins can be rapid and transient [84,85]. For example, in rats subjected to a mechanical compression injury increased tau phosphorylation occurs in cortical regions in as little as 10 min following injury but then is undetectable by 12 hours [84]. Transient elevations of serum and CSF tau can also be detected following TBI in rats [86,87]. More sustained increases in a cleaved form of tau have been found in the cortex and hippocampus of rats following a CCI injury [85], and increased phospho-tau has been observed in cortex of mice 30 days after 5 mild TBI injuries were delivered utilizing a weight drop device [75]. A single blast-induced TBI resulted in acute (up to two weeks) axonal injury in the form of silver impregnated neuronal processes in rats [88] and increased levels of phosphorylated tau were detected in NFT like lesions in mice [58]. In rats, increased levels of tau have been found in multiple brain regions at 71 days following a blast injury [89]. Thus acute to subacute changes in tau are common across a spectrum of experimental TBI models.

However, few studies have yet revealed whether a subsequent chronic neurodegenerative changes are induced. Indeed the only study to our knowledge that has addressed this issue is the study by Hoshino *et al.* [90] who studied the chronic effects of fluid percussion injury in rats. They reported a progressive loss of cortical neurons over a six-month period accompanied by appearance of increasing numbers of phospho-tau immunoreactive neurons [90]. As noted above, rodent models of TBI are widely used because of their accessibility and relatively low cost. However, in addition to the anatomic differences between rodent and human brain, rodent models for CTE are potentially limited by the fact that mice and rats do not readily develop human like neurofibrillary pathology, a key histopathological feature of CTE. Rodents and humans differ in life spans, and species differences in tau also contribute to the difficulty of inducing NFT like lesions in rodents. The lack of human-like NFT pathology in rats and wild type mice has in particular been a limiting factor in the development of CTE models and has led to attempts to create more human like tauopathy models by introducing human tau transgenes into mice.

The non-traumatic neurodegenerative diseases that most closely resemble CTE pathologically are some forms of

frontotemporal dementia (FTD). While most FTD cases can occur without evidence of family history, in some families the disease is inherited and caused by mutations in the tau gene on chromosome 17 [91]. Mice expressing either human wild type or FTD-mutant tau develop a neurodegenerative disease spontaneously and accumulate NFT-like lesions with aging [92]. These lines have been used to investigate tauopathy-related dementias and offer potentially relevant models for CTE [92]. However to date only limited use has been made of these mice to study TBI. One study [93] examined the effects of mild repetitive TBI using a CCI injury in transgenic mice expressing the shortest human tau isoform. Transgenic and non-transgenic mice were subjected to a total of 16 mild TBI injuries over a period of 4 weeks and animals were examined histopathologically at 9 months after injury. Despite this aggressive injury protocol there was no general effect on histopathology or behavior of the tau transgene other than in one of the 18 transgenic mice that showed behavioral deficits and developed extensive telencephalic NFT like lesions and cerebral atrophy. In contrast, increases in total and phospho-tau immunoreactivity have been seen following a more severe CCI injury in JNPL mice which express the four repeat form of human tau containing the P301L mutation associated with FTD [94]. In another study, mice that expressed the 6 isoforms of human tau and lacked murine tau were subjected to a single or repetitive mild TBI using an electromagnetically controlled impactor; three weeks later, phospho-tau immunoreactivity, neuronal injury, and glial reaction were more pronounced in the group with repetitive mild TBI [95].

As discussed above, CTE is a heterogeneous disease with inconsistent pathology including not only tau but also A β lesions. Accordingly, several studies have investigated the effects of TBI in 3xTg-AD mice [94,96,97]. These mice also express the P301L mutation in tau associated with FTD but in combination with APP and presenilin mutations associated with familial Alzheimer's disease. With aging these mice develop increased A β 40 and A β 42 levels, accumulate intraneuronal A β and exhibit amyloid plaques and NFT like lesions, thus exhibiting a more complete spectrum of AD like pathology when compared to other transgenic mouse models. Controlled cortical impact injury in 3xTg-AD mice accelerated the development of tau abnormalities [96] with increased phospho-tau immunoreactivity seen histologically in the days following injury [96]. Tau changes persisted for at least 7 days after injury and were associated with intra-axonal accumulation of several kinases that phosphorylate tau [96]. In agreement with previous reports in other transgenic mouse models [98-100], the CCI injury in 3xTg-AD mice also resulted in intra-axonal A β accumulation [96]. However, in this model combining tauopathy and amyloidosis, the anatomic

pattern and time course of changes in A β and tau were distinct [96], and treatment with a γ -secretase inhibitor blocked posttraumatic A β accumulation but had no effect on tau pathology suggesting that once initiated these two pathologies may take independent courses of progression [96]. In contrast, reports from Loane *et al.* indicate that A β -reducing agents prevented TBI-induced neurodegeneration [101,102].

Better animal models of CTE are an urgent need given that to date no injury in animals has replicated the full spectrum of pathological findings in human CTE. Acute to subacute changes in tau are common across a range of experimental TBI models suggesting that injured animals can manifest at least some initial cytoskeletal changes observed in brains of humans with CTE. However most studies have focused on acute effects of TBI and greater attention should be directed to determining whether a chronic neurodegenerative condition can be induced after TBI in animals. As mild TBI and concussions draw increasing attention as the most common type of civilian and military TBI, future studies of repetitive concussions in both rodent and non-rodent species will be needed to determine the optimal model.

Neuroimaging of CTE

Identification of specific imaging biomarkers for CTE has been challenged by the lack of correlation between any available neuroimaging studies and post-mortem tissue assessments demonstrating histopathologic hallmarks of CTE. To date, no systemic *in vivo* biological markers have been identified that reveal the presence of CTE. Given that most case reports of CTE involve individuals with a history of repetitive sports-related trauma, the neuroimaging portion of this review will focus upon abnormalities present in athletes with a history of concussion.

Common structural abnormalities often reported in the brain of professional boxers include cavum septum pellucidum (often with fenestrations), ventricular and sulcal enlargement, and cortical and cerebellar atrophy. Although CSP is often reported in studies of boxers and is postulated to be a sign of DP/CTE [43], and a marker of brain atrophy [44,103,104], its relatively high incidence in the normal adult population precludes its presence as a diagnostic specific to boxing [105]. Despite the lack of specific *in vivo* findings in CTE, studies using both traditional and newer imaging methods have advanced our understanding of the consequences of repetitive head trauma. Newer imaging modalities and the use or development of advanced analytical methods (e.g., ref [106]) have revealed brain abnormalities in repetitive head trauma where more traditional methods found none, suggesting that comprehensive evaluation of CTE should include neuroimaging as part of an overall clinical assessment.

Structural Imaging

The major traditional structural imaging techniques used to evaluate brain function in boxers, and more recently in football players, are computed tomography (CT) and magnetic resonance imaging (MRI). In acute settings, these standard, structural imaging techniques have clinical utility in ruling out other acquired brain disorders such as tumor or stroke and have been utilized to rule out potentially fatal consequences of acute TBI such as hemorrhagic contusion, subdural and epidural hematomas, and subarachnoid hemorrhage. However, structural (or functional for that matter) imaging findings alone are not sufficient to diagnose CTE or determine who might eventually develop CTE. In addition, some of the structural imaging changes identified in CTE are similar to those seen in AD [107], and there may be similarities as well with normal aging. Early studies demonstrated that CT might not be as effective as MRI in identifying injury in the acute phase [108]. In non-acute settings, high-field MRI may be the preferred modality in the evaluation of TBI due to its improved tissue clarity and contrast of pathology, and because it eliminates the risk of ionizing radiation associated with CT [103,107,109]. These features of MRI make it a valuable diagnostic tool for determining the extent of chronic TBI [107].

In view of the improved tissue contrast and additional biologically relevant information afforded by MRI, early studies began to investigate whether MRI was superior to CT as an imaging modality in boxers. A study conducted in 1990 did not demonstrate MRI superiority to CT in 47 retired amateur boxers as compared to two age-matched control groups: soccer and track and field athletes [110]. However, another study published that same year found that some abnormalities detected by MRI were not shown by CT [103]. There were several limitations in these early studies, including comparison of professional boxers to amateur boxers, who may not show neurologic damage because of their limited number of exposures, and incomplete information in professional boxers in terms of number of years spent boxing or the number of bouts fought. In addition, most studies were cross-sectional, thus it cannot be determined from these studies whether the abnormalities were present before or the result of, boxing [105]. It should be noted that both MRI and CT have seen dramatic technological improvements over the past two decades.

A recent review of the MRI literature [107] used a systematic checklist approach to assess 100 unselected consecutive 1.5 and 3.0 Tesla MRI examinations of professional boxers to determine the extent of identifiable TBI findings. Results indicated that 76% of boxers had at least one finding associated with TBI: 59% had hippocampal atrophy, 43% CSP, 32% dilated perivascular spaces, 29% diffuse axonal injury, 24% cerebral atrophy,

19% increased lateral ventricular size, 14% pituitary gland atrophy, 5% arachnoid cysts, and 2% had contusions [107] (Figures 7 and 8). Statistical relationships were found between number of bouts and lateral ventricular size, and years of fighting correlated with dilated perivascular spaces and diffuse axonal injury. An earlier systematic review of the literature from 1985 to 2000 [111] on concussion in a variety of contact sports, found that male boxers had the highest frequency of concussion at the recreational level [111]. While these reviews indicate significant brain abnormalities in boxers exposed to frequent concussive and subconcussive blows to the head, prospective studies will be needed to determine whether the underlying process is degenerative and progressive in nature and related to and consistent with CTE clinical outcomes.

Diffusion tensor imaging

Newer imaging techniques such as diffusion tensor imaging (DTI) (Figure 9) are more sensitive for identifying the presence of axonal injury that occur due to the shearing forces of TBI. DTI is a relatively new technique and provides information reflecting the integrity of white matter fiber tracts.

Quantitative values used for spatially mapping DTI include apparent diffusion coefficient (typically mean diffusivity, MD), which measures the magnitude of the diffusion of water molecules, and fractional anisotropy (FA) or relative anisotropy (RA), which measure the directional preference of water molecules throughout brain fibers. White matter tracts normally constrain the isotropic diffusion of water. An FA value approaching 1.0 reflects maximal anisotropic diffusion, and values approaching zero indicate compromised white matter integrity. In addition to FA and RA, axial diffusivity and

radial diffusivity describing magnitude of diffusion longitudinal and transverse to the dominant direction of white matter tracts may also be derived from the calculated diffusion tensor. DTI values are affected when there are changes to the microstructure of brain tissue. Disruption of axonal integrity due to shearing forces associated with head trauma results in a general reduction of FA values as the normal barrier to isotropic diffusion is altered. This type of information is not available from routine MRI; thus, white matter abnormalities that may be present due to repetitive TBI often go undetected with routine imaging.

Chappell *et al.* [113] used a voxel-based analysis of DTI data to examine the ADC and FA in professional boxers and found previously unreported abnormalities that were assumed to reflect cumulative brain injury resulting from non-severe, repetitive head trauma [113]. Regions were found to have increased ADC, decreased FA, and decreased ADC in gray matter in the boxer group compared to a group of controls with no neurological history. The regions affected included lower splenium and cortical regions laterally and dorsolaterally in the frontal and posterior lobes. The authors concluded that their findings represented evidence that sustained boxing activity causes structural abnormalities in the brain.

Similarly, an earlier study by Zhang and colleagues [114] using quantitative diffusion weighted imaging (DWI) found increases in the whole brain diffusion constant in professional boxers as compared to age-matched, non-boxing control subjects. The increased diffusion values were observed despite negative or nonspecific results on routine MR imaging, indicating that this imaging modality may show early pathologic changes in the cellular and microvascular structure of the brain in boxers. Zhang *et al.* [114] postulated that given the similar findings in

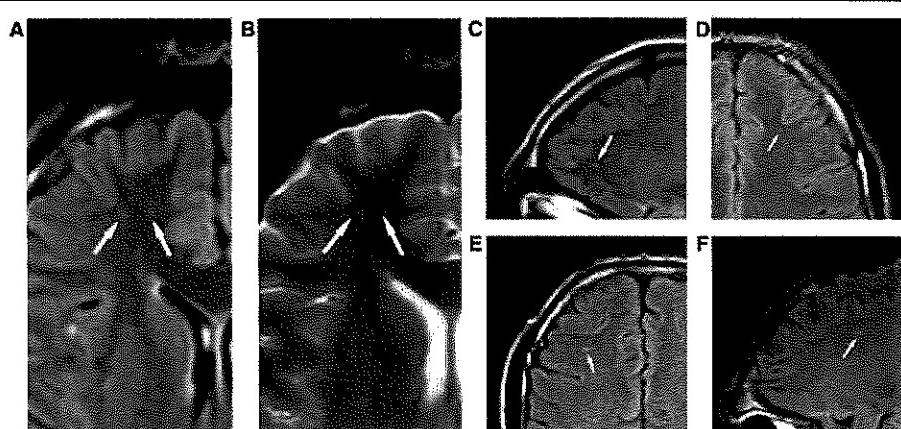


Figure 7 Diffuse axonal injury on MRI. (Panels A–F) Typical diffuse axonal injury, indicated by arrow. DAI was defined as focal areas of abnormal increased signal intensity on FLAIR and T2-weighted sequences, measuring up to 5 mm in maximum diameter, and located at the gray matter=white matter interface or within or adjacent to the corpus callosum. In the Orrison *et al.* sample, 29% had DAI. Reproduced from Orrison *et al.* [107] with permission.

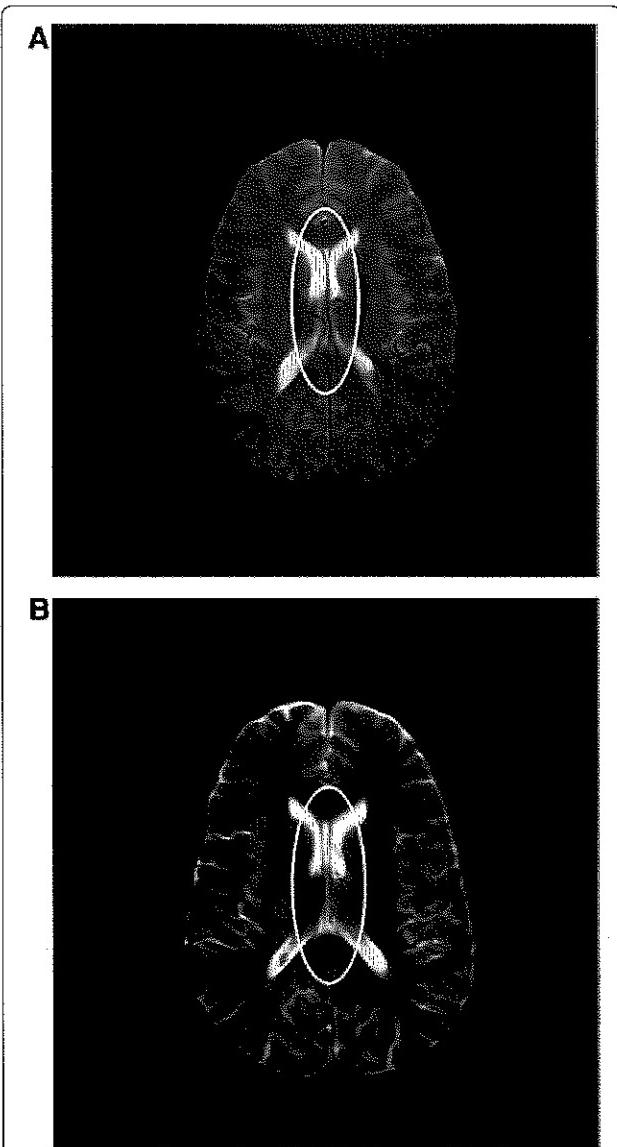


Figure 8 Cavum septum pellucidum (CSP) on MRI. (A) Mild (B) Moderate. No severe CSP was observed. Orrison et al. [107] examined one hundred consecutive unselected MRI scans that were performed on professional unarmed combatants (boxers and mixed martial arts fighters) in two outpatient imaging settings. Seventy-five were imaged on a 1.5-Tesla (T) MRI system and 25 were imaged on a 3.0-T high field MRI system. CSP was defined as the presence of a fluid filled space separating laminae of the septum pellucidum. CSP was graded as mild, moderate, or severe. CSP was found in 42% of subjects, due in part to the improved resolution of the higher field strength MRI systems used.

patients with dementia, their results suggested that the whole brain diffusion coefficient represents preclinical signs of cognitive decline [114]. A later study by Zhang *et al.* [115] using DTI in a sample of 49 professional boxers and 19 healthy controls focused on the corpus callosum and the internal capsule. In that study, 42 boxers (86%) had a normal routine, clinical MRI and 7

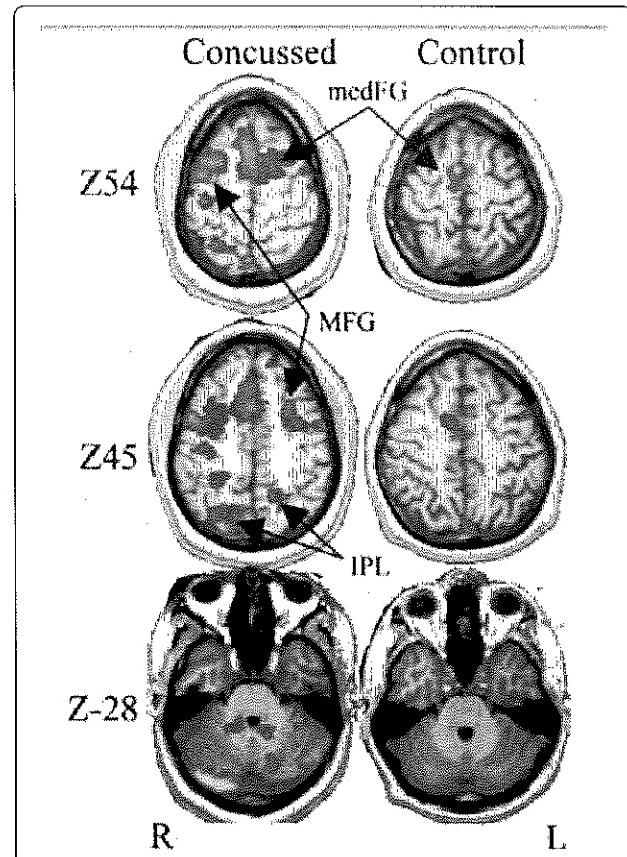


Figure 9 BOLD imaging was acquired from college football players while performing a bimanual sequencing task. The "concussed" group consisted of four individuals who were within one week of sustaining a concussion. The "control" group included the additional four players who did not receive a concussion, with imaging acquired post-season. Regions of significantly increased activity during performing of the bimanual sequencing task are seen within the brains of those individuals who sustained a concussion as compared with controls. Images and data are reproduced from Jantzen *et al.* [112] with permission.

had nonspecific white matter disease. In the boxer group, the whole brain diffusion constant was increased and FA was decreased significantly in the CC and posterior limb of IC, which the authors postulate may represent preclinical signs of subtle brain injury in professional boxers. Importantly, the increases in diffusion were found without brain abnormalities revealed on standard MR images, suggesting that diffusion tensor imaging is an important tool in the monitoring of brain function in professional boxers [113-115] and may be particularly useful in the multivariate diagnostic evaluation of individuals with CTE (Figure 10).

Functional magnetic resonance imaging (fMRI)

fMRI involves acquisition of a blood oxygen level dependent (BOLD) sequence during performance of a specific task (Figure 11). The BOLD sequence is sensitive to

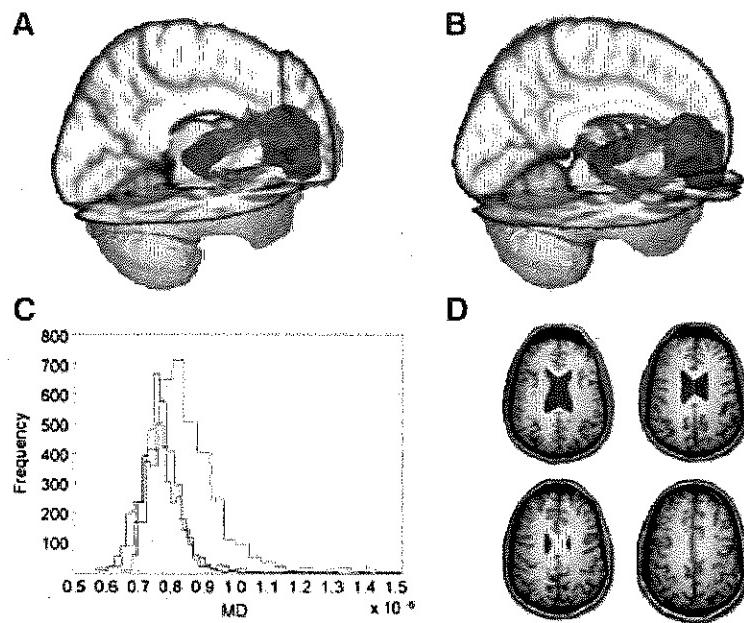


Figure 10 Diffusion tensor imaging (DTI) of TBI. Diffusion weighted volumes in 64 directions were collected from 22 patients with TBI (18 moderate/severe and 4 mild based upon Mayo classification system for TBI severity) and from 21 age-matched controls. Processing for DTI was performed and anatomic regions-of-interest were identified in controls for performing probabilistic tractography to study thalamo-cortical connections. Templates were generated that included white matter tracts isolated from probabilistic tractography. All brains were transformed into standard space and templates were applied to TBI patients and healthy controls to explore differences in white matter integrity between groups. Patients with a small (**A**) and large (**B**) number of abnormal voxels are shown. Histograms of MD values (**C**) from the patient shown in frame A (blue), frame B (red), as compared with a mean atlas (**D**) are shown. Images and data are reproduced from Squarcina *et al.* [116] with permission.

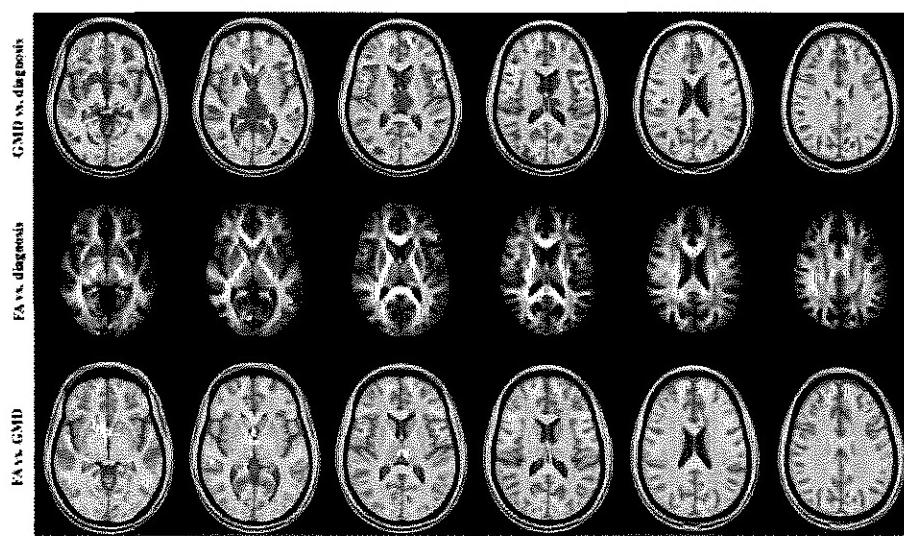


Figure 11 Sparse canonical correlation analysis (SCCA) of T1-weighted MP-RAGE and 30-direction diffusion tensor images (DTI) datasets are used to quantify traumatically induced disruption of WM and cortical networks. The cohort includes 17 controls and 16 patients with TBI (age and gender matched). Each patient had a history of non-penetrating TBI of at least moderate severity. White matter integrity is assessed by DTI and fractional anisotropy (FA) maps are generated. Separately, probabilistic segmentation of the T1-weighted imaging is performed to assess gray matter integrity. Variation in brain shape across subjects is normalized by diffeomorphically mapping these data into a population-specific template space. Image processing steps rely on the Camino and ANTs (Advanced Normalization Tools) neuroimage analysis open source toolkits. SCCA demonstrates significant differences between the control and patient groups in both the FA ($p < 0.002$) and gray matter ($p < 0.01$) that are widespread but largely focus on thalamocortical networks related to the limbic system. Using SCCA-identified regions, a strong correlation is identified between degree of injury in WM and GM within the patient group. Figure courtesy of James R. Stone.

conformational changes in hemoglobin and can demonstrate regional variations in blood oxygenation. It is believed these changes in blood oxygenation reflect variations in neuronal activity. However, this point is a subject of controversy given the potential for the neurovascular apparatus to be altered in states of disease.

Distinct regional differences in BOLD signal have been reported in multiple studies of concussed athletes vs. controls. Chen *et al.* [117] utilized fMRI with a working memory task to study 16 athletes (13 hockey players, 2 wrestlers, one snowboarder), most of whom had a history of > 5 career concussions. An interval of between 1 and 14 months had passed between the scan and time of last concussion. Although no differences in task performance were seen between groups, significantly different regional patterns of activation were seen within the mid-dorsolateral prefrontal cortex (MDPC) in the concussed athletes as compared to controls. In a separate study, Chen *et al.* [118] utilized an fMRI working memory task to demonstrate abnormal activation patterns in the MDPC in 9 concussed athletes as compared to controls. Of note, no significant differences were seen with routine structural imaging or behavioral outcomes between groups. Lovell *et al.* [119] employed an N-back working memory task to evaluate 28 athletes within a mean of 6.6 days after sustaining a concussion. A components analysis identified three distinct networks that were activated in both concussed athletes and controls during participation in the N-back task. One of these networks involving Brodmann's area 6 demonstrated increased levels of activity in concussed athletes compared with controls. Of note, the degree of increased activation in Brodmann's area 6 in the concussed athletes correlated significantly with prolonged recovery time and delayed return to play.

Positron emission tomography (PET)

PET imaging allows for characterization of the uptake and spatial localization of radiotracers injected intravenously (IV). This imaging modality allows for the sensitive detection of small molar concentrations of radiotracers given its sensitivity for detecting the high-energy photons (512 keV) produced by radioactive decay through pair production. PET imaging in sports related TBI is currently limited and has generally been confined to use of ¹⁸fluoro-deoxyglucose (¹⁸FDG), a glucose analog that reflects metabolism. In brain, where glucose is the sole energy source, ¹⁸FDG is an excellent tracer for this purpose. Provenzano *et al.* [120] employed ¹⁸FDG PET to study 19 boxers, aged 20 to 38 yrs, and compared them to 7 age-equivalent controls. The boxers had participated in an average of 17.3 matches, had performed poorly in a match or had been knocked out, and were referred for assessment because of clinical signs of neurological impairment. The PET scans were acquired as an element of the

clinical work-up. Retrospective evaluation of these scans was performed. Specific regions of hypometabolism were seen in the boxers' brains as compared to those of the controls, including the posterior cingulate cortex, parieto-occipital cortex, frontal lobes, and cerebellum.

In addition to assessing regional metabolism, PET can be used to detect the presence of specific molecules or abnormal cellular processes (molecular imaging). A β -deposition is an inconsistent feature in CTE. Diffuse plaques are found in about half (47%) of neuropathologically verified CTE cases [21], a figure that represents a greater frequency than that observed acutely after severe TBI (~30%) [51]. PET imaging using A β probes are being currently used in large scale studies of AD. The use of amyloid imaging in suspected CTE has not been established but will be of interest given the similarity between AD and CTE phenotypes and may be useful in determining whether the presence of amyloid post TBI can help predict outcome. This will be of particular interest if the presence of amyloid is associated with worse outcomes, since interventions that reduce the trajectory of brain amyloid accumulation have already been identified in studies of AD.

The original Corsellis series identified diffuse amyloid in 50% of the cases of DP. As mentioned above, DeKosky reported acute amyloidosis within hours or days even in young patients [51]. The natural history of these deposits remains to be established, and this is an important question that can now be addressed with amyloid imaging. Menon has recently reported just such a study, and his conclusion is that the initial burst of amyloidosis is rapidly cleared [121]. One wonders, however, whether clearance might become less efficient as repeated TBI occurs, and longer term studies of such a possibility are underway in our center. In another study, about half of subjects in the chronic phase of recovery from a severe TBI showed positive amyloid scans [122].

Of particular relevance to CTE, PET imaging ligands are now in development for detection of abnormally phosphorylated tau associated with neurofibrillary tangles (Figure 5). Zhang *et al.* [19] recently reported development of an ¹⁸ F labeled compound ([¹⁸ F] T807) which demonstrated high affinity and selectivity for tau in competitive assays designed to assess tau binding in post-mortem human brain slices derived from individuals with AD. This study also reported high uptake and washout in rodent brains, suggesting adequate blood brain barrier penetration. Given the presence of abnormally phosphorylated tau tangles in CTE, there is great interest in exploring the utility of this probe as a potential *in vivo* marker for CTE. Successful development of a molecular imaging ligand for neurofibrillary tangles would open the door for epidemiological studies to assess to the true prevalence of this disease, correlative studies to determine other potential imaging diagnostics for CTE, and as a

potential metric to determine the efficacy of therapeutic or mitigation strategies for the treatment or prevention of CTE. Recent reports indicate that [¹⁸F] T807 has been successfully employed for the detection of CTE tauopathy *in vitro* and *in vivo* [123–125] (Figure 12).

In summary, neuroimaging in CTE holds promise in serving as an *in vivo* biomarker and should be used in adjunct with a comprehensive history and thorough clinical diagnostic evaluation in life. Prospective, longitudinal neuroimaging studies are needed to help define the clinical and biological markers associated with, and

specific to, CTE. Body fluid markers may eventually complement neuroimaging markers, especially in medical centers without access to PET. These body fluid markers have recently been reviewed in detail elsewhere [126].

Conclusions

The association of CTE with certain sports and with battlefield blast exposure provides a mandate for the construction of accurate databases and epidemiological studies. Securing valid incidence, prevalence, and relative risk data are essential. Current academic papers continue to meet with criticism that the risk is being overstated [127,128]. While awaiting accurate data upon which to estimate relative risk, informed consent should be developed and offered to those contemplating exposure to repetitive TBI. While the administrative organizations of high impact sports and the military are the obvious organizations to begin informing potential athletes and recruits about the possible risk of CTE, another significant challenge will be the development of informed consent procedures for those overseeing the exposure of children and adolescents [27]. Finding the right balance of established fact and informed opinion will be a challenge, so as not to create unnecessary concern. Extension of genetic epidemiology studies to the pediatric and adolescent population will also be a challenge, albeit a worthy one [27]. The acquisition of definitive data about what genetic factors identified in adolescents are predictive of the eventual personal risk of CTE will require decades of study but are essential.

In parallel, application of validated laboratory models and execution of human clinical trials in the TBI/CTE area should be accelerated. Adaptation of repetitive TBI systems to the mouse holds promise for elucidating the molecular pathogenesis of CTE. The role of APOE genotype should be given high priority in both the animal and the human clinical studies [25,27]. Compounds emerging from drug discovery efforts in academic and pharmaceutical neurodegenerative disease programs should be considered for assessment in TBI [100]. Emerging data from the AD literature indicating the key role of immune-inflammatory processes may illuminate CTE as well. New data implicate IL-1 β in facilitating the development of tauopathy while reducing amyloidosis [68]. Tau oligomerization [129] may also contribute to the pathogenesis of CTE and may emerge acutely or after a delay [90]. Taken together with the A β independence of progressive tauopathy as reported by Brody [96], the hypothesis that tauopathy and amyloidosis can be dissociated in TBI is supported. The strong association of PTSD with TBI should also be evaluated and clarified [79].

The challenge of accelerating molecular neuropathology research in an era of dwindling resources is a major concern. Recent alliances between the NFL and the NIH,

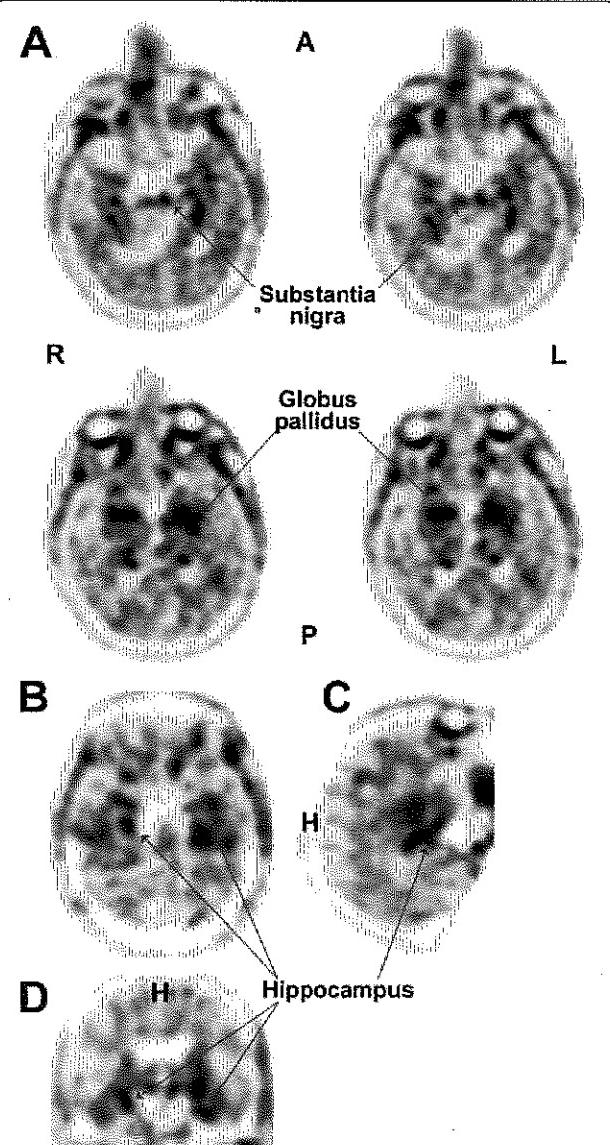


Figure 12 [¹⁸F]-T807 PET imaging from a 71-year-old retired NFL player. [¹⁸F]-T807 signals (arrows) originate from the globus pallidus (GP), substantia nigra (SN), and hippocampus. Images depict axial (A) sagittal (B) and coronal (C and D) orientation of the brain. A, anterior; P, posterior; L, left; R, right; H, head. Images and data are reproduced from Mitsis et al. [123] with permission.

between the NFL and General Electric, and between the Department of Defense and the NIH Alzheimer's Disease Neuroimaging Initiative provide some optimism that all the stakeholders are becoming engaged. Permanent commitment and substantial resources from these stakeholders will be required to offset the general reductions in federal support (including NIH and the Department of Defense) due to policies resulting in the recent sequestration of federal funds. In the absence of reliable prevalence data, the calculation of the potential healthcare savings by reduction of TBI exposure is not possible. The total cost of TBI exposure, of course, must take into account what may be enormous payouts from potential class action litigation verdicts. In addition to significant fiscal savings, the support of translational and clinical research programs in TBI/CTE and of development of policies that mitigate some or all of the attributable dementia risk represented by TBI/CTE is obviously justifiable on compassionate grounds. TBI, whether deliberate or unavoidable exposures, represents a source of pain and suffering that could be eliminated or at least greatly reduced with the pooled commitment and resources of the medical, sports, and military sectors. The high visibility of CTE in the media in the early 21st century makes this an opportune moment to apply the information reviewed herein so as to make important advances in elucidation of pathogenesis and in drug discovery.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

SG and STD summarized the history of CTE, wrote the overview and the neuropathology and PET imaging sections, and they were responsible for the overall organization, collation and final editing of the paper. GE, MDI, and STA drafted the experimental pathology sections. EM and JRS drafted the MRI sections. JB and EM drafted the neuropsychology section. All authors read and approved the final manuscript.

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References

1. Martland HS: Punch drunk. *JAMA* 1928, **91**:1103–1107. doi:10.1001/jama.1928.02700150029009.
2. Millsbaugh JA: *Dementia pugilistica*. *US Naval Med Bull* 1937, **35**:297–303.
3. Critchley M: Medical aspects of boxing, particularly from neurological standpoint. *Brit Med J* 1957, **1**:357–362.
4. Corsellis JAN, Bruton CJ, Freeman-Browne D: The aftermath of boxing. *Psychol Med* 1973, **3**:270–303.
5. Saing T, Dick M, Nelson PT, Kim RC, Cribbs DH, Head E: Frontal cortex neuropathology in dementia pugilistica. *J Neurotrauma* 2012, **29**(6):1054–1070. doi:10.1089/neu.2011.1957.
6. Brain Injury in Boxing: Council on Scientific Affairs. *JAMA* 1983, **249**(2):254–257. doi:10.1001/jama.1983.03330260072039.
7. Boxing participation by children and adolescents. *Pediatrics* 2011, **128**:617–623. doi:10.1542/peds.2011-1165.
8. N.Y. MMA legalization push continues. [http://espn.go.com/new-york/story/_/id/8881747/association-boxing-commissions-working-legalize-mma-new-york]
9. *Dementia Pugilistica*. http://en.wikipedia.org/wiki/Dementia_pugilistica. At this URL, Wikipedia maintains a semi-comprehensive list of famous boxers, American football players, hockey players, and wrestlers believed to have been affected by DP/CTE. The following summary of famous persons with DP/CTE is reprinted with permission: **Boxing:** Rocky Graziano, Jimmy Ellis, Floyd Patterson, Bobby Chacon, Jerry Quarry, Mike Quarry, Jimmy Young, Wilfred Benitez, Emile Griffith, Willie Pep, Freddie Roach, Sugar Ray Robinson, Billy Conn, Joe Frazier, Fritzie Zivic, Meldrick Taylor, Muhammad Ali. **American football:** As of December 2012, thirty-three former National Football League (NFL) players have been diagnosed post-mortem with CTE, among them Mike Webster, Terry Long, Andre Waters, Justin Strzelczyk, Tom McHale, Former Detroit Lions lineman, Pro Bowler Lou Creekmur, former Houston Oilers/Miami Dolphins linebacker John Grimsley, former Tampa Bay Buccaneers guard Tom McHale, former Cincinnati Bengals wide receiver Chris Henry, former Chicago Bears safety Dave Duerson, former Buffalo Bills star running back Cookie Gilchrist, Wally Hilgenberg, Colt tight end John Mackey, former San Diego Charger Junior Seau, and former Atlanta Falcons safety Ray Easterling. **Ice hockey:** Reg Fleming, Rick Martin, Derek Boogaard. **Wrestling:** Chris Benoit, Andrew Martin.
10. Omalu BI, DeKosky ST, Minster RL, Kamboh MI, Hamilton RL, Wecht CH: Chronic traumatic encephalopathy in a national football league player. *Neurosurgery* 2005, **57**:128–134.
11. NFL Picks New Chairmen for Panel on Concussions. [http://www.nytimes.com/2010/03/17/sports/17concussions.html?_r=0]
12. Soccer Study Ties "Heading" to Brain Damage. [http://www.cbsnews.com/8301-504763_162-57332833-10391704/soccer-study-ties-heading-to-brain-damage/]
13. In Debate About Fighting in Hockey, Medical Experts Weigh In. [<http://www.nytimes.com/2011/12/13/sports/hockey/in-debate-about-fighting-in-hockey-medical-experts-weigh-in.html?pagewanted=all>]
14. Brain Ailments in Veterans Likened to Those in Athletes. [<http://www.nytimes.com/2012/05/17/us/brain-disease-is-found-in-veterans-exposed-to-bombs.html?pagewanted=all>]
15. Omalu B, Hammers JL, Bailes J, Hamilton RL, Kamboh MI, Webster G, Fitzsimmons RP: Chronic traumatic encephalopathy in an Iraqi war veteran with posttraumatic stress disorder who committed suicide. *Neurosurg Focus* 2011, **31**(5):E3.

16. Suicide in the NFL. [<http://www.psychologytoday.com/blog/two-takes-depression/201205/suicide-in-the-nfl>]
17. Has Athletes' Use of Performance Enhancing Drugs Played a Role in Suicides? [http://articles.philly.com/2012-05-13/sports/31690175_1_ped-concussions-study-of-retired-athletes]
18. Veterans and Brain Disease. [<http://www.nytimes.com/2012/04/26/opinion/kristof-veterans-and-brain-disease.html>]
19. Xia CF, Arteaga J, Chen G, Gangadhamath U, Gomez LF, Kasi D, Lam C, Liang Q, Liu C, Mochala VP, Mu F, Sinha A, Su H, Szardenings AK, Walsh JC, Wang E, Yu C, Zhang W, Zhao T, Kolb HC: [18F]T807, a novel tau positron emission tomography imaging agent for Alzheimer's disease. *Alzheimers Dement* 2013, **9**(6):666–76.
20. Gavett BE, Cantu RC, Shenton ME, Lin AP, Nowinski CJ, McKee AC, Stern RA: Clinical appraisal of chronic traumatic encephalopathy: current perspectives and future directions. *Curr Opin Neurol* 2011, **24**:525–531.
21. McKee AC, Stern RA, Nowinski CJ, Stein TD, Alvarez VE, Daneshvar DH, Lee HS, Wojtowicz SM, Hall G, Baugh CM, Riley DO, Kubilus CA, Cormier KA, Jacobs MA, Martin BR, Abraham CR, Ikeno T, Reichard RR, Wolozin BL, Budson AE, Goldstein LE, Kowall NW, Cantu RC: The spectrum of disease in chronic traumatic encephalopathy. *Brain* 2013, **136**(Pt 1):43–64. doi:10.1093/brain/aws307.
22. Omalu B, Bailes J, Hamilton RL, Kamboh MI, Hammers J, Case M, Fitzsimmons R: Emerging histomorphologic phenotypes of chronic traumatic encephalopathy in American athletes. *Neurosurgery* 2011, **69**:173–183.
23. Stern RA, Riley DO, Daneshvar DH, Nowinski CJ, Cantu RC, McKee AC: Long-term consequences of repetitive brain trauma: chronic traumatic encephalopathy. *PM R* 2011, **3**(Suppl 2):S460–S467.
24. Baugh CM, Stamm JM, Riley DO, Gavett BE, Shenton ME, Lin A, Nowinski CJ, Cantu RC, McKee AC, Stern RA: Chronic traumatic encephalopathy: neurodegeneration following repetitive concussive and subconcussive brain trauma. *Brain Imaging Behav* 2012, **6**:244–254.
25. Jordan BD, Relkin NR, Ravid LD, Jacobs AR, Bennett A, Gandy S: Apolipoprotein E epsilon 4 associated with chronic traumatic brain injury in boxing. *JAMA* 1997, **278**:136–140.
26. DeKosky ST, Ikonomovic MD, Gandy S: Traumatic brain injury–football, warfare, and long-term effects. *N Engl J Med* 2010, **363**(14):1293–1296.
27. Gandy S, DeKosky ST: APOE epsilon 4 status and traumatic brain injury on the gridiron or the battlefield. *Sci Transl Med* 2012, **4**(134):134ed4.
28. Gavett BE, Stern RA, McKee AC: Chronic traumatic encephalopathy: a potential late effect of sport-related concussive and subconcussive head trauma. *Clin Sports Med* 2011, **30**:179–188. xi.
29. Barth J, Freeman JR, Broshek DK, Varney RN: Acceleration-deceleration sport-related concussion: the gravity of it all. *J Athl Train* 2001, **36**:253–256.
30. Hart J, Kraut MA, Wornack KB, Strain J, Didehbani N, Bartz E, Conover H, Manshinghani S, Hanzhang L, Cullum CM: Neuroimaging of cognitive dysfunction and depression in aging retired national football league players: a cross sectional study. *JAMA Neurol* 2013, **70**(3):326–335.
31. Parker H: Traumatic encephalopathy ('punch drunk') of professional pugilists. *J Neurol Psychopathol* 1934, **15**:20–28.
32. Corsellis JA: Boxing and the brain. *BMJ* 1989, **298**:105–109.
33. Dale GE, Leigh PN, Luthert P, Anderton BH, Roberts GW: Neurofibrillary tangles in dementia pugilistica are ubiquitinated. *J Neurol Neurosurg Psychiatry* 1991, **54**:116–118.
34. Allsop D, Haga S, Bruton C, Ishii T, Roberts GW: Neurofibrillary tangles in some cases of dementia pugilistica share antigens with amyloid beta-protein of Alzheimer's disease. *Am J Pathol* 1990, **136**:255–260.
35. Hof PR, Bouras C, Buée L, Delacourte A, Perl DP, Morrison JH: Differential distribution of neurofibrillary tangles in the cerebral cortex of dementia pugilistica and Alzheimer's disease cases. *Acta Neuropathol* 1992, **85**:23–30.
36. Roberts GW, Allsop D, Bruton C: The occult aftermath of boxing. *J Neural Neurosurg Psychiatry* 1990, **53**:373–378.
37. Roberts GW: Immunocytochemistry of neurofibrillary tangles in dementia pugilistica and Alzheimer's disease: evidence for common genesis. *Lancet* 1988, **2**:1456–1458.
38. Tokuda T, Ikeda S, Yanagisawa N, Ihara Y, Glenner GG: Re-examination of ex-boxers' brains using immunohistochemistry with antibodies to amyloid beta-protein and tau protein. *Acta Neuropathol* 1991, **82**:280–285.
39. Nowak LA, Smith GG, Reyes PF: Dementia in a retired world boxing champion: case report and literature review. *Clin Neuropathol* 2009, **28**:275–280.
40. Geddes JF, Vowles GH, Robinson SF, Sutcliffe JC: Neurofibrillary tangles, but not Alzheimer-type pathology, in a young boxer. *Neuropathol Appl Neurobiol* 1996, **22**:12–16.
41. Jordan BD, Karik AB, Horwitz MS, Sweeney D, Relkin NR, Petito CK, Gandy S: Apolipoprotein E epsilon 4 and fatal cerebral amyloid angiopathy associated with dementia pugilistica. *Ann Neurol* 1995, **38**:698–699.
42. Mitsis E, Riggio S, D'Antonio E, Goldstein M, DeKosky ST, Naidich T, Dellman B, Machac J, Elder G, Sano M, Gandy S, Gordon W: Flortetapir scanning excludes Alzheimer's disease in a retired NFL player with delayed cognitive impairment. *Hum Amyloid Imag Conf Abstr* 2013, <http://www.worldeventsforum.com/hai/current-program-2013.html>.
43. Bogdanoff B, Natter HM: Incidence of cavum septum pellucidum in adults: a sign of boxer's encephalopathy. *Neurology* 1989, **39**:991–992.
44. McCrory P: Cavum septi pellucidi—a reason to ban boxing? *Br J Sports Med* 2002, **36**:157–161.
45. Aviv RI, Tomlinson G, Kendall B, Thakkar C, Valentine A: Cavum septi pellucidi in boxers. *Can Assoc Radiol J* 2010, **61**:29–32.
46. Guterman A, Smith RW: Neurological sequelae of boxing. *Sports Med* 1987, **4**:194–210.
47. Roberts AJ: *Brain Damage In Boxers* London: Pitman Medical Scientific Publications. 1969.
48. Ross RJ, Cole M, Thompson JS, Kim KH: Boxers—computed tomography, EEG, and neurological evaluation. *JAMA* 1983, **249**:211–213.
49. Viano DC, Casson IR, Pellman EJ, Bir CA, Zhang L, Sherman DC, Boitano MA: Concussion in professional football: comparison with boxing head impacts—part 10. *Neurosurgery* 2005, **57**:1154–1172.
50. Braak H, Braak E: Evolution of the neuropathology of Alzheimer's disease. *Acta Neurol Scand Suppl* 1996, **165**:3–12.
51. Ikonomovic MD, Uryu K, Abrahamson EE, Ciallella JR, Trojanowski JQ, Lee VM, Clark RS, Marion DW, Wisniewski SR, DeKosky ST: Alzheimer's pathology in human temporal cortex surgically excised after severe brain injury. *Eur Neurol* 2004, **190**:192–203.
52. Omalu BI, DeKosky ST, Hamilton RL, Minster RL, Kamboh MI, Shakir AM, Wecht CH: Chronic traumatic encephalopathy in a national football league player: part II. *Neurosurgery* 2006, **59**:1086–1092.
53. Mac Donald CL, Johnson AM, Cooper D, Nelson EC, Werner NJ, Shimony JS, Snyder AZ, Raichle ME, Witherow JR, Fang R, Flaherty SF, Brody DL: Detection of blast-related traumatic brain injury in U.S. military personnel. *N Engl J Med* 2011, **364**:2091–2100.
54. Morey RA, Haswell CC, Selgrade ES, Massoglia D, Liu C, Weiner J, Marx CE, Cernak I, McCarthy G, MIRECC Work Group: Effects of chronic mild traumatic brain injury on white matter integrity in Iraq and Afghanistan war veterans. *Hum Brain Mapp*
55. Magnuson J, Leonessa F, Ling GS: Neuropathology of explosive blast traumatic brain injury. *Curr Neurol Neurosci Rep* 2012, [Epub ahead of print].
56. Mayorga MA: The pathology of primary blast overpressure injury. *Toxicology* 1997, **121**:17–28.
57. Cernak I: The importance of systemic response in the pathobiology of blast-induced neurotrauma. *Front Neurol* 2010, **1**:151.
58. Goldstein LE, Fisher AM, Tagge CA, Zhang XL, Velisek L, Sullivan JA, Upreti C, Kracht JM, Ericsson M, Wojnarowicz MW, Goletiani CJ, Maglakelidze GM, Casey N, Moncaster JA, Minaeva O, Moir RD, Nowinski CJ, Stern RA, Cantu RC, Geiling J, Bluszta J, Wolozin BL, Ikeno T, Stein TD, Budson AE, Kowall NW, Chargin D, Sharon A, Saman S, Half GF, Moss WC, Cleveland RO, Tanzi RE, Stanton PK, McKee AC: Chronic traumatic encephalopathy in blast-exposed military veterans and a blast neurotrauma mouse model. *Sci Transl Med* 2012, **4**(134):134ra60.
59. Blennow K, Jonsson M, Andreasen N, Rosengren L, Wallin A, Hellström PA, Zetterberg H: No neurochemical evidence of brain injury after blast overpressure by repeated explosions or firing heavy weapons. *Acta Neurol Scand* 2011, **123**:245–251. doi:10.1111/j.1600-0404.2010.01408.x.
60. Shahim P, Tegner Y, Wilson DH, Randall J, Skillback T, Pazooki D, Kallberg B, Blennow K, Zetterberg H: Blood biomarkers for brain injury in concussed professional ice hockey players. *JAMA Neurol* 2014, doi:10.1001/jamaneurol.2014.367.
61. Abel EL: Football increases the risk for Lou Gehrig's disease, amyotrophic lateral sclerosis. *Percept Mot Skills* 2007, **104**:1251–1254.
62. Chiò A, Traynor BJ, Swinler R, Mitchell D, Hardiman O, Mora G, Beghi E, Logroscino G: EURALS consortium. Amyotrophic lateral sclerosis and soccer: a different epidemiological approach strengthen the previous findings. *J Neurol Sci* 2008, **269**:187–188.

63. Povlishock JT: Traumatically induced axonal injury: pathogenesis and pathobiological implications. *Brain Pathol* 1992, **2**:1–12.
64. Smith DH, Chen XH, Iwata A, Graham DI: Amyloid beta accumulation in axons after traumatic brain injury in humans. *J Neurosurg* 2003, **98**:1072–1077.
65. Uryu K, Chen XH, Martinez D, Browne KD, Johnson VE, Graham DI, Lee VM, Trojanowski JQ, Smith DH: Multiple proteins Implicated In neurodegenerative diseases accumulate in axons after brain trauma in humans. *Exp Neurol* 2007, **208**:185–192.
66. Graham DI, Gentleman SM, Nicoll JA, Royston MC, McKenzie JE, Roberts GW, Mrak RE, Griffin WS: Is there a genetic basis for the deposition of beta-amyloid after fatal head injury? *Cell Mol Neurobiol* 1999, **19**:19–30.
67. Johnson VE, Murray L, Raghupathi R, Stewart J, Nicoll JA, MacKinnon MA, McIntosh TK, Graham DI: No evidence for the presence of apolipoprotein epsilon 4, interleukin-1 alpha allele 2 and interleukin-1 beta allele 2 cause an increase in programmed cell death following traumatic brain injury in humans. *Clin Neuropathol* 2006, **25**:255–264.
68. Ghosh S, Wu MD, Shafit SS, Kyriakides S, LaFerla FM, Olschowka JA, O'Banion MK: Sustained interleukin-1 beta overexpression exacerbates tau pathology despite reduced amyloid burden in an Alzheimer's mouse model. *J Neurosci* 2013, **33**:5053–5064.
69. Cernak I: Animal models of head trauma. *NeuroRx* 2005, **2**:410–422.
70. Marklund N, Hillered L: Animal modelling of traumatic brain injury in preclinical drug development: where do we go from here? *Br J Pharmacol* 2011, **164**:1207–1229.
71. Elder GA, Mitsis EM, Ahlers ST, Cristian A: Blast-induced mild traumatic brain injury. *Psychiatr Clin North Am* 2010, **33**:757–781. doi:10.1016/j.psc.2010.08.001.
72. Pandey DK, Yadav SK, Mahesh R, Rajkumar R: Depression-like and anxiety-like behavioural aftermaths of impact accelerated traumatic brain injury in rats: a model of comorbid depression and anxiety? *Behav Brain Res* 2009, **205**:436–442. doi:10.1016/j.bbr.2009.07.027.
73. Laurer HL, Bareyre FM, Lee VM, Trojanowski JQ, Longhi L, Hoover R, Saatman KE, Raghupathi R, Hoshino S, Grady MS, McIntosh TK: Mild head injury increasing the brain's vulnerability to a second concussive impact. *J Neurosurg* 2001, **95**:859–870.
74. DeFord SM, Wilson MS, Rice AC, Clausen T, Rice LK, Barabnova A, Bullock R, Hamm RJ: Repeated mild brain injuries result in cognitive impairment in B6C3F1 mice. *J Neurotrauma* 2002, **19**:427–438.
75. Kane MJ, Angoa-Perez M, Briggs DI, Viano DC, Kreipke CW, Kuhn DM: A mouse model of human repetitive mild traumatic brain injury. *J Neurosci Methods* 2012, **203**:41–49.
76. Shultz SR, Bao F, Omana V, Chiu C, Brown A, Cain DP: Repeated mild lateral fluid percussion brain injury in the rat causes cumulative long-term behavioral impairments, neuroinflammation, and cortical loss in an animal model of repeated concussion. *J Neurotrauma* 2012, **29**:281–294. doi:10.1089/neu.2011.2123.
77. Chen Z, Leung LY, Mountney A, Liao Z, Yang W, Lu XC, Dave J, Deng-Bryant Y, Wei G, Schmid K, Shear DA, Tortella FC: A novel animal model of closed-head concussive-induced mild traumatic brain injury: development, implementation, and characterization. *J Neurotrauma* 2012, **29**:268–280.
78. Ahlers ST, Vasserman-Stokes E, Shaughness MC, Hall AA, Shear DA, Chavko M, McCarron RM, Stone JR: Assessment of the effects of acute and repeated exposure to blast overpressure in rodents: toward a greater understanding of blast and the potential ramifications for injury in humans exposed to blast. *Front Neurosci* 2012, **3**:32. doi:10.3389/fnins.2012.00032.
79. Elder GA, Dorr NP, De Gasperi R, Gama Sosa MA, Shaughness MC, Maudlin-Jeronimo E, Hall AA, McCarron RM, Ahlers ST: Blast exposure induces post-traumatic stress disorder-related traits in a rat model of mild traumatic brain injury. *J Neurotrauma* 2012, **29**:2564–2575. doi:10.1089/neu.2012.2510.
80. Taber KH, Warden DL, Hurley RA: Blast-related traumatic brain injury: what is known? *J Neuropsychiatry Clin Neurosci* 2006, **18**(2):141–145.
81. Smith DH, Chen XH, Nonaka M, Trojanowski JQ, Lee VM, Saatman KE, Leoni MJ, Xu BN, Wolf JA, Meaney DF: Accumulation of amyloid beta and tau and the formation of neurofilament inclusions following diffuse brain injury in the pig. *J Neuropathol Exp Neurol* 1999, **58**:982–992.
82. Fitzpatrick MO, Dewar D, Teasdale GM, Graham DI: The neuronal cytoskeleton in acute brain injury. *Br J Neurosurg* 1998, **12**:313–317.
83. Saatman KE, Graham DI, McIntosh TK: The neuronal cytoskeleton is at risk after mild and moderate brain injury. *J Neurotrauma* 1998, **15**:1047–1058.
84. Chen LJ, Wang YJ, Tseng GF: Compression alters kinase and phosphatase activity and tau and MAP2 phosphorylation transiently while inducing the fast adaptive dendritic remodeling of underlying cortical neurons. *J Neurotrauma* 2010, **27**:1657–1669.
85. Gabbita SP, Scheff SW, Menard RM, Roberts K, Fugaccia I, Zemlan FP: Cleaved-tau: a biomarker of neuronal damage after traumatic brain injury. *J Neurotrauma* 2005, **22**:83–94.
86. Liliang PC, Lillang CL, Lu K, Wang K, Weng HC, Hsieh CH, Tsai YD, Chen HJ: Relationship between injury severity and serum tau protein levels in traumatic brain injured rats. *Resuscitation* 2010, **81**:1205–1208.
87. Siman R, McIntosh TK, Soltesz KM, Chen Z, Neumar RW, Roberts VL: Proteins released from degenerating neurons are surrogate markers for acute brain damage. *Neurobiol Dis* 2004, **16**:311–320.
88. Garman RH, Jenkins LW, Switzer RC 3rd, Bauman RA, Tong LC, Swauger PV, Parks SA, Ritzel DV, Dixon CE, Clark RS, Bayir H, Kagan V, Jackson EK, Kochanek PM: Blast exposure in rats with body shielding is characterized primarily by diffuse axonal injury. *J Neurotrauma* 2011, **28**:947–959.
89. Kovacs E, Gyorgy AB, Kwon SKC, Wingo DL, Kamnaksh A, Long JB, Kasper CE, Agoston DV: The effect of enriched environment on the outcome of traumatic brain injury, a behavioral, proteomics, and histological study. *Front Neurosci* 2011, **5**:42.
90. Hoshino S, Tamako A, Takahashi M, Kobayashi S, Furukawa T, Oaki Y, Mori O, Matsuno S, Shoji S, Inomata M, Teramoto A: Emergence of immunoreactivities for phosphorylated tau and amyloid-beta protein in chronic stage of fluid percussion injury in rat brain. *Neuroreport* 1998, **9**(8):1879–1883.
91. Premi E, Padovani A, Borroni B: Frontotemporal lobar degeneration. *Adv Exp Med Biol* 2012, **724**:114–127.
92. Gotz J, Ittner L: Animal models of Alzheimer's disease and frontotemporal dementia. *Nat Rev Neurosci* 2008, **9**:532–544.
93. Yoshiyama Y, Uryu K, Higuchi M, Longhi L, Hoover R, Fujimoto S, McIntosh T, Lee VM, Trojanowski JQ: Enhanced neurofibrillary tangle formation, cerebral atrophy, and cognitive deficits induced by repetitive mild brain injury in a transgenic tauopathy mouse model. *J Neurotrauma* 2005, **22**:1134–1141.
94. Tran HT, Sanchez L, Esparza TJ, Brody DL: Distinct temporal and anatomical distributions of amyloid-β and tau abnormalities following controlled cortical impact in transgenic mice. *PLoS One* 2011, **6**e25475. doi:10.1371/journal.pone.0025475.
95. Ojo JO, Mouzon B, Greenberg MB, Bachmeier C, Mullan M, Crawford F: Repetitive mild traumatic brain injury augments tau pathology and glial activation in aged hTau mice. *J Neuropathol Exp Neurol* 2013, **72**:137–151.
96. Tran HT, LaFerla FM, Holtzman DM, Brody DL: Controlled cortical impact traumatic brain injury in 3xTg-AD mice causes acute intra-axonal amyloid-β accumulation and independently accelerates the development of tau abnormalities. *J Neurosci* 2011, **31**:9513–9525. doi:10.1523/JNEUROSCI.0858-11.2011.
97. Tran HT, Sanchez L, Brody DL: Inhibition of JNK by a peptide inhibitor reduces traumatic brain injury-induced tauopathy in transgenic mice. *J Neuropathol Exp Neurol* 2012, **71**:116–129. doi:10.1097/NEN.0b013e3182456a6d.
98. Smith DH, Nakamura M, McIntosh TK, Wang J, Rodriguez A, Chen X-H, Raghupathi R, Saatman KE, Clerneni J, Schmidt ML, Lee VM, Trojanowski JQ: Brain trauma induces massive hippocampal neuron death linked to a surge in beta-amyloid levels in mice overexpressing mutant amyloid precursor protein. *Am J Pathol* 1998, **153**:1005–1010.
99. Abrahamson EE, Ikonomicov MD, Dixon CE, DeKosky ST: Simvastatin therapy prevents brain trauma-induced increases in beta-amyloid peptide levels. *Ann Neurol* 2009, **66**:407–414.
100. Abrahamson EE, Ikonomicov MD, Dixon CE, DeKosky ST: Simvastatin therapy prevents brain trauma-induced increases in beta-amyloid peptide levels. *Ann Neurol* 2009, **66**:407–414.
101. Loane DJ, Pocivavsek A, Moussa CE, Thompson R, Matsuoka Y, Faden AI, Rebeck GW, Burns MP: Amyloid precursor protein secretases as therapeutic targets for traumatic brain injury. *Nat Med* 2009, **15**:377–379. doi:10.1038/nm.1940.
102. Loane DJ, Washington PM, Vardanian L, Pocivavsek A, Hoe HS, Duff KE, Cernak I, Rebeck GW, Faden AI, Burns MP: Modulation of ABCA1 by an LXR agonist reduces β-amyloid levels and improves outcome after traumatic brain injury. *J Neurotrauma* 2011, **28**:225–236. doi:10.1089/neu.2010.1595.
103. Jordan B, Zimmerman R: Computed tomography and magnetic resonance imaging comparisons in boxers. *JAMA* 1990, **263**:1670–1674.
104. Jordan BD, Jahre C, Hauser WA, Zimmerman RD, Zarelli M, Lipsitz EC, Johnson V, Warren RF, Tsairis P, Folk FS: CT of 338 active professional boxers. *Radiology* 1992, **185**:509–512.

105. McCrory P, Zazyn T, Cameron P: The evidence for chronic traumatic encephalopathy in boxing. *Sports Med* 2007, **37**:467–476.
106. Chappell MH, Brown JA, Dalrymple-Alford JC, Ulug AM, Watts R: Multivariate analysis of diffusion tensor imaging data improves the detection of microstructural damage in young professional boxers. *Magn Reson Imaging* 2008, **26**:1398–1405.
107. Orrison WW Jr, Hanson EH, Alamo T, Watson D, Sharma M, Perkins TG, Tandy RD: Traumatic brain injury: a review and high-field mri findings in 100 unarmed combatants using a literature-based checklist approach. *J Neurotrauma* 2009, **26**:689–701.
108. Gandy SE, Snow RB, Zimmerman RD, Deck MD: Cranial nuclear magnetic resonance imaging in head trauma. *Ann Neurol* 1984, **16**:254–257.
109. Jordan BD: Chronic traumatic brain injury associated with boxing. *Semin Neurol* 2000, **20**:179–185.
110. Haglund Y, Bergstrand G: Does Swedish amateur boxing lead to chronic brain damage? 2. A retrospective study with CT and MRI. *Acta Neurol Scand* 1990, **82**:297–302.
111. Koh JO, Cassidy JD, Watkinson EJ: Incidence of concussion in contact sports: a systematic review of the evidence. *Brain Inj* 2003, **17**(10):901–917.
112. Jantzen KJ, Anderson B, Steinberg FL, Kelso JA: A prospective functional MR imaging study of mild traumatic brain injury in college football players. *AJNR Am J Neuroradiol* 2004, **25**(5):738–745.
113. Chappell MH, Ulug AM, Zhang L, Heitger MH, Jordan BD, Zimmerman RD, Watts R: Distribution of microstructural damage in the brains of professional boxers: a diffusion MRI study. *J Magn Reson Imaging* 2006, **24**:537–542.
114. Zhang L, Ravdin LD, Relkin N, Zimmerman RD, Jordan B, Lathan WE, Ulug AM: Increased diffusion in the brain of professional boxers: a preclinical sign of traumatic brain injury? *AJNR Am J Neuroradiol* 2003, **24**:52–57.
115. Zhang L, Heier LA, Zimmerman RD, Jordan B, Ulug AM: Diffusion anisotropy changes in the brains of professional boxers. *AJNR Am J Neuroradiol* 2006, **27**:2000–2004.
116. Squarcina L, Bertoldo A, Ham TE, Heckemann R, Sharp DJ: A robust method for investigating thalamic white matter tracts after traumatic brain injury. *Neuroimage* 2012, **63**(2):779–788. doi:10.1016/j.neuroimage.2012.07.016.
117. Chen JK, Johnston KM, Frey S, Petrides M, Worsley K, Ptito A: Functional abnormalities in symptomatic concussed athletes: an fMRI study. *Neuroimage* 2004, **22**:68–82.
118. Chen JK, Johnston KM, Petrides M, Ptito A: Recovery from mild head injury in sports: evidence from serial functional magnetic resonance imaging studies in male athletes. *Clin J Sport Med* 2008, **18**:241–247.
119. Lovell MR, Pardini J, Welling J, Collins MW, Bakal J, Lazar N, Roush R, Eddy WF, Becker JT: Functional brain abnormalities are related to clinical recovery and time to return-to-play in athletes. *Neurosurgery* 2007, **61**:352–359. discussion 359–360.
120. Provenzano FA, Jordan B, Tikofsky RS, Saxena C, Van Heertum RL, Ichise M: F-18 FDG PET imaging of chronic traumatic brain injury in boxers: a statistical parametric analysis. *Nucl Med Commun* 2010, **31**:952–957.
121. Hong YT, Veenith T, Dewar D, Outram JG, Mani V, Williams C, Pirnott S, Hutchinson PJ, Tavares A, Canales R, Mathis CA, Klunk WE, Aigbirhio FI, Coles JP, Baron JC, Pickard JD, Fryer TD, Stewart W, Menon DK: Amyloid imaging with carbon 11-labeled Pittsburgh compound B for traumatic brain injury. *JAMA Neurol* 2014, **71**(1):23–31. doi:10.1001/jamaneuro.2013.4847. PubMed PMID: 24217171.
122. Kawai N, Kawanishi M, Kudomi N, Maeda Y, Yamamoto Y, Nishiyama Y, Tamiya T: Detection of brain amyloid β deposition in patients with neuropsychological impairment after traumatic brain injury: PET evaluation using Pittsburgh Compound-B. *Brain Inj* 2013, **27**(9):1026–1031.
123. Mitsis EM, Riggio S, Kostakoglu L, Dickstein DL, Machac J, Delman B, Goldstein M, Jennings D, D'Antonio E, Martin J, Naidich TP, Alois A, Fernandez C, Seibly J, DeKosky ST, Elder GA, Marek K, Gordon W, Hof PR, Sano M, Gandy S: Tauopathy PET and amyloid PET in the diagnosis of chronic traumatic encephalopathies: studies of a retired NFL player and of a man with FTD and a severe head injury. *Trans Psychiatry* 4:e441. doi:10.1038/tp.2014.91.
124. Kolb HC, Attardo G, Conway K, Gomez F, Liang Q, Lin Y-G, Siderowf A, Skovronsky DM, Mintun MA: Detection of PHF-Tau pathology with T557, T726 and [18 F]T807 in brain sections from Alzheimer's and non-Alzheimer's tauopathy patients. In *Program and Abstract Book of the 8th Annual Human Amyloid Imaging Meeting: January 15-17 2014; Miami*. 2014:21.
125. Mintun MA: PET Imaging of Human Tau Deposits with F18-T807. In *In the 4th Annual Traumatic Brain Injury Conference: 16-17 April 2014; Crystal City, VA*.
126. DeKosky S, Blennow K, Ikonomovic M, Gandy S: Acute and chronic traumatic encephalopathies: pathogenesis and biomarkers. *Nat Rev Neurol* advance online publication 26 March 2013; doi:10.1038/nrneuro.2013.36.
127. NFL Doctor Says Disease is Overstated. [http://www.nytimes.com/2013/03/28/sports/football/doctor-for-nfl-says-study-overstates-effects-of-cte.html?pagewanted=all&r=0]
128. Report: NFL Doctor Recommended Removing CTE from Safety Sheet. [http://www.cbssports.com/nfl/blog/eye-on-football/21964949/report-nfl-doctor-recommended-removing-cte-from-safety-sheet]
129. Hawkins BE, Krishnamurthy S, Castillo-Carranza DL, Sengupta U, Prough DS, Jackson GR, Dewitt DS, Kayed R: Rapid accumulation of endogenous tau oligomers in a rat model of traumatic brain injury. *J Biol Chem* 2013, **288**(23):17042–17050. doi:10.1074/jbc.M113.472746.

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Acute and chronic traumatic encephalopathies: pathogenesis and biomarkers

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Abstract

Over the past decade, public awareness of the long-term pathological consequences of traumatic brain injury (TBI) has increased. Such awareness has been stimulated mainly by reports of progressive neurological dysfunction in athletes exposed to repetitive concussions in high-impact sports such as boxing and American football, and by the rising number of TBIs in war veterans who are now more likely to survive explosive blasts owing to improved treatment. Moreover, the entity of chronic traumatic encephalopathy (CTE)—which is marked by prominent neuropsychiatric features including dementia, parkinsonism, depression, agitation, psychosis, and aggression—has become increasingly recognized as a potential late outcome of repetitive TBI. Annually, about 1% of the population in developed countries experiences a clinically relevant TBI. The goal of this Review is to provide an overview of the latest understanding of CTE pathophysiology, and to delineate the key issues that are challenging clinical and research communities, such as accurate quantification of the risk of CTE, and development of reliable biomarkers for single-incident TBI and CTE.

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The authors declare no competing interests.

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Introduction

Approximately 1% of the population of developed countries experiences traumatic brain injury (TBI) each year.¹ The pathological consequences of TBI² have received increasing media attention following reports of progressive neurological dysfunction in athletes who have been exposed to repetitive concussions in high-impact sports (initially boxing and, in the past 8 years, American football), and the increasing number of war veterans presenting with TBI caused by explosive blasts. Improved battlefield emergency care and, consequently, improved survival means that soldiers who might previously have died from polytrauma now survive and can go on to develop substantial cognitive deficits. This principle applies most clearly to veterans of the recent wars in Iraq and Afghanistan. The US Department of Defense terms TBI the ‘signature injury’ among veterans from these wars.³

In this article, we provide an overview of the acute and long-term pathophysiology of single-incident and repetitive TBI, focusing in particular on chronic traumatic encephalopathy (CTE). We briefly discuss imaging as well as plasma and cerebrospinal fluid (CSF) biomarkers for this disorder, and finally consider preventive measures that can be undertaken to avoid such injury. Understanding of the issues discussed will assist clinical and research communities to manage the risk of CTE and avoid disease.

Single-incident TBI

Acute sequelae

Many complications of TBI are evident immediately or soon after the injury.^{4–14} Acute post-traumatic sensory, motor and neurocognitive syndromes often occur owing to brain contusions, intracerebral haemorrhage, and axonal shearing. Skull fracture further complicates the pathobiology, leading to direct brain shearing and haemorrhage if the fracture is severe or depressed, and increasing the risk of ischaemia from vasoconstriction precipitated by blood products, seizures and infection. Seemingly mild ‘closed-head’ TBI, in which the skull is not fractured, can lead to diverse and sometimes disabling symptoms such as chronic headaches, dizziness and vertigo, difficulty in concentrating, word-finding problems, depression, irritability and impulsiveness. The duration of such symptoms is variable, but can be months or longer.

Post-traumatic stress disorder (PTSD) is a frequent accompaniment of military-related TBI, especially severe cases.^{5–14} Each syndrome can occur without the other: PTSD can occur following events of severe stress, and TBI can occur, even in combat, without resulting in PTSD. Their relationship, and how to differentiate and treat both disorders, is a growing area of research.

TBI sustained during combat is usually associated with an explosion, such as from artillery or an improvised explosive device, and these blasts often propel soldiers against a wall or the interior of a vehicle, which can result in a deceleration head injury. Although differentiation between the injury from the blast and the deceleration head trauma might not always be possible, investigations are under way not only to track severity of head trauma in soldiers

by using accelerometers in ‘smart helmets’, but also to potentially counteract harmful effects of the blast.

Long-term sequelae

Cause and effect relationships for the delayed sequelae of single-incident severe TBI are not well understood, owing to the variable latent period between injury and subsequent neurological and neuropsychiatric dysfunction. Some closed-head injuries involve only brief loss of consciousness—that is, mild TBI—but memory, affective and executive dysfunction can nevertheless emerge and cause substantial impairment and life disruption. Even when no overt damage is apparent on neuroimaging, such symptoms can linger for months, causing disruption of learning with subsequent poor academic or work performance.

Severe single-incident TBI, with or without skull fracture, can lead to permanent brain damage, with incomplete recovery and residual sensory, motor and cognitive deficits. Unlike mild repetitive TBI, discussed below, severe single-incident TBI is associated with increased risk of late-onset Alzheimer disease (AD).^{15–20} As the late consequences of TBI generate pathology that is reminiscent of AD or pure tauopathy, we posit that these two disorders have a shared pathogenesis. However, we must keep in mind that the pathogenesis of spontaneous or genetic AD or tauopathy *per se* might not be equivalent to that of post-traumatic neurodegeneration.

A recent study found that some neurodegenerative causes of death (namely, AD and amyotrophic lateral sclerosis) were four times higher in US National Football League players than in the general population.²¹ No such trend in the prevalence of Parkinson disease was noted. Paradoxically, the overall mortality rate of these retired players was substantially lower than that of the general population. Independent replication of the study should help to clarify this puzzling dissociation of outcomes. Notably, differential diagnosis of AD versus CTE on clinical grounds is not entirely reliable, which highlights a key knowledge gap in this area: no compelling epidemiological data are available to enable estimation of the incidence or prevalence of these neurodegenerative sequelae of TBI. Differential diagnosis in the future is likely to improve with the advent of neuropathology imaging—that is, amyloid imaging, which is already in clinical use;^{22,23} and tauopathy imaging, which is showing promise^{24,25} but is still in development.

Sequence of pathological events

Extrapolating from the known pathological and clinical course of AD and other tauopathies, we can construct a hypothetical temporal sequence of events in TBI and CTE. The most frequently proposed mechanism in TBI is ‘diffuse axonal injury’ (Figure 1), which is associated with alterations in many physiological processes, and accumulation of abnormal protein aggregates in cells and the brain parenchyma.² Altered proteolytic and proteostatic pathways are associated with changes that are evident at the histological level. Here, the similarity between pathways of idiopathic and post-traumatic neurodegeneration is most evident, in that both involve accumulation of apparently identical protein aggregates.

Within hours of single-incident severe TBI in humans and experimental animals, dramatic accumulation of amyloid precursor protein is evident in damaged axons and cell bodies.²⁶ Some studies in case series demonstrated that these changes are associated with increased brain concentrations of soluble amyloid- β ₄₂ ($A\beta_{42}$) peptides and deposition of diffuse $A\beta$ plaques in brain tissue in approximately 30% of patients with severe TBI, regardless of patient age (Figure 2).^{27–29} These plaques, which are predominantly $A\beta_{42}$ -immunoreactive, are similar to those observed in the earliest stages of AD pathology. An association between densities of such deposits and the apolipoprotein E (*APOE*) ε4 allele, which is in itself a risk factor for AD, has been established in boxers^{30,31} and patients with fatal head injuries.³² In addition, poly morphisms in the gene encoding neprilysin, an $A\beta$ -degrading enzyme, probably influence the rate of $A\beta$ degradation and clearance after TBI.³³

Some patients with parkinsonism have a history of single-incident TBI.^{34,35} Genetic, environmental and physical factors presumably distinguish people who are destined to develop parkinsonism from those destined to manifest AD years after TBI. Notably, precise dose-response data linking injury severity with induction of pathology in sports associated with neurodegeneration are not available. Similarly, no sport-specific factors are known that can distinguish TBI associated with boxing versus American football, soccer, hockey and wrestling. Typically, TBI associated with these sports is combined under the rubric of ‘mild repetitive’ TBI.

Mild repetitive TBI

The classic clinicopathological correlation linking neuro cognitive effects of repetitive mild head injury with tauopathy was described in boxers by Corsellis.^{36,37} The pathology is distinct from the clinical and pathological sequelae of severe single-incident TBI. Landmark neuro pathology studies reported that dementia pugilistica, or ‘punch drunk’ syndrome, involves prominent tauopathy, with patchy distribution of neurofibrillary tangles (NFTs) and neuropil threads throughout the neocortex.^{36–39} Diffuse $A\beta$ plaques were present in 50–100% of cases depending on the series, whereas tauopathy was a universal finding across all case series.^{38,40}

Dementia pugilistica

Dementia pugilistica typically involves NFT accumulation in the superficial grey matter, especially at the base of the sulci, with prominent perivascular and periventricular pathology. Subsequent immunohistochemistry studies of the dementia pugilistica cases that were originally examined by Corsellis demonstrated that all cases had diffuse $A\beta$ deposits (but not neuritic plaques) in addition to NFTs.^{38,39} The precise relationships between these lesions and clinical symptoms of dementia pugilistica is unknown, but may involve axonal injury, as traumatic tearing of neuronal connections ('axonal shearing', a component of diffuse axonal injury) is known to impair cortical and thalamic circuitry, thereby contributing to cognitive impairment and dementia.

As with single-incident TBI, a role for genetic factors in the development of AD neuropathology and dementia following mild repetitive TBI is emerging.^{30,41} The *APOE* ε4 allele is a well-established risk factor for amyloid plaque deposition and AD.^{42,43} Boxers

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who were *APOE ε4* carriers were more likely to develop dementia pugilistica than those lacking the *ε4* allele,³⁰ suggesting that this allele confers greater vulnerability to brain pathology in trauma. Parkinsonism is also associated with dementia pugilistica. When rigidity and tremor dominate the clinical picture, the term ‘pugilistic parkinsonism’ is applied. An abundance of NFTs and the absence of Lewy bodies distinguishes pugilistic parkinsonism from idiopathic Parkinson disease. However, as in Parkinson disease, nigral neurons are lost in pugilistic parkinsonism, which probably underlies the clinical symptoms of this syndrome, although the precise mechanism is not known.

Chronic traumatic encephalopathy

In addition to studies in boxers, examination of the brains of several professional American football players and wrestlers has revealed an explanation for the little-discussed fact that football players who played for many years often suffered cognitive and neuropsychiatric decline in later life. Retired players with three or more reported concussions were found to have fivefold increased prevalence of mild cognitive disorders and threefold increased prevalence of substantial memory problems compared with healthy controls.⁴⁴ Although later cognitive decline in long-time professional football players had been noted anecdotally for years, the first autopsy report on such a player appeared in the literature only recently.⁴⁵ The pathology was indistinguishable from that of dementia pugilistica. This case had frequent diffuse neocortical Aβ plaques and sparse NFT pathology.⁴⁵ To distinguish the aetiology from that of boxing, Omalu and DeKosky reinstated the term ‘chronic traumatic encephalopathy’,^{46,47} a term from the 1920s and 1950s that caught on with the popular press in the contexts of sports and military injury.

CTE is characterized by distinct patterns of Aβ and tau pathology, although the extent of pathology varies between CTE cases (Figures 2 and 3). McKee and colleagues⁴⁸ noted that nearly 50% of CTE cases selected from the literature (on basis of the presence of NFT pathology) also had diffuse Aβ plaques, with nearly 30% of cases having classic AD (neuritic) plaques. Whereas boxing scoring includes records of knockouts, concussion histories in football players have been notoriously poor, owing to both absence of meticulous records and the culture of the sport, in which injuries are ignored by both players and coaching staff, to keep players in the game. The index case report of TBI in American football⁴⁵ has since been followed by confirmatory case studies,^{49–52} which found that cognitive decline began years after cessation of play.

Cohort composition and player position might influence assessment and determination of the risk, diagnosis and mechanisms of CTE. In the ‘early days’ of professional football, players wore leather helmets, which were later replaced by plastic helmets with canvas strap-interiors and foam cushioning inside. Modern US football helmets, including face masks, have not prevented concussions or severe TBI with loss of consciousness. Modern technology involving ‘smart helmets’ that record the physics of impact will help us to understand and quantify such injuries.

Dementia pugilistica had been recognized for decades, whereas reports of a similar phenomenon in football emerged in the late 1990s and early 2000s. At the Professional Football Hall of Fame, long-standing players would gather every year, providing a unique

opportunity to see high-level players from year to year. As the former players aged, increasing numbers of their members were noted to have memory problems. In addition to legal claims against the National Football League for the obvious orthopaedic injuries from playing football, claims for neurocognitive damage also began to emerge. One of the early players to sue for cognitive and neuropsychiatric injury was the first professional football player to undergo autopsy and can be regarded as the index case of sports-related CTE.^{44,45,53}

Once the problem was identified, researchers and the National Football League, as well as other athletic organizing bodies, responded rapidly. Since the emergence of multiple cases from several independent pathology laboratories and clinics,^{40,47} and in other high-impact sports such as wrestling,⁵¹ the phenomenon has been accepted by the medical and athletic authorities, with appropriate attempts to minimize its occurrence in contact sports. At least 12 former National Football League players have committed suicide over the past 25 years, many suffering from cognitive and affective symptoms. In two of the more recent suicides, the players shot themselves in the heart, which enabled their brains to be studied postmortem.^{53,55,56}

Broad public awareness of CTE now exists. We have little idea, however, of the risk of developing CTE following TBI, or of the basis of interindividual differences in susceptibility to this disorder. *APOE ε4* alleles³⁰ might increase the risk of CTE in professional football players as they do in boxing, but conclusive evidence is lacking. Polymorphisms in the Aβ-degrading enzyme neprilysin have also been provisionally linked to CTE.³³ The largest collected reports of CTE have not published genetic analyses. Coordinated national and international approaches to CTE research are needed.

CTE research centres could be modelled on the existing NIH Alzheimer Disease Centers and the Alzheimer Disease Neuroimaging Initiative (ADNI). Indeed, the US Department of Defense has recently initiated a ‘military TBI ADNI’, and the National Football League has teamed up with the NIH to launch new research into CTE. An important starting point will be lifelong TBI diary databases for those at highest risk for TBI and CTE, in order to obtain reliable estimates of the lifetime accumulation of TBI and lifetime risk of developing CTE. Not every boxer develops dementia pugilistica and not every football player develops CTE; given the current state of technology, whole-genome sequencing of patients with CTE could provide comprehensive genetic profiles of those who develop CTE as well as those who experience identical lifelong TBI histories but remain cognitively intact.

Many soldiers experience head trauma periodically in training. Omalu recently reported the index case of ‘military CTE’ in a veteran of the Iraq war who committed suicide,⁵⁷ and suggested a link to the clinical PTSD phenotype, as mentioned above. These observations were recently confirmed and extended by an independent group of investigators.⁵⁸

Biomarkers

Neuroimaging

Increasing evidence suggests that single-incident severe TBI and mild repetitive concussions are associated with a heterogeneous profile of neuropathological changes resembling those in chronic neurodegenerative disorders, including AD and Parkinson disease. Such a similarity supports the use of amyloid-binding PET ligands for *in vivo* monitoring of neuropathology after TBI. PET ligands for imaging of tauopathy and synucleinopathy are currently in development (Figure 4). Clinical diagnosis of AD can be aided by quantifying A β , tau, and phospho-tau levels in CSF,⁵⁹ even in the absence of a positive amyloid PET scan.⁶⁰ These biomarkers could be especially useful for differential diagnosis of CTE,⁶¹ as the A β deposits are primarily diffuse, and NFT distribution is different to that in AD and frontotemporal dementia. Prior to regulatory approval, these ligands must be validated against neuropathology to ensure that the imaging signal corresponds to the underlying amyloid or tau pathology, as already demonstrated for Pittsburgh compound B⁶² and florbetapir.²³

Body fluid biomarkers

The clinical diagnosis and evaluation of single-incident severe TBI, which involves the combination of clinical examination and MRI, is relatively straightforward. A substantial challenge for the clinician, however, is assessment of whether patients with milder forms of head trauma, and nonspecific symptoms such as dizziness and headache, have acquired permanent damage to the brain. Indeed, mild TBI can cause neuronal damage with selective swelling and disconnection of long axons in the white matter of the brain.⁶³ Such challenges can be addressed by measurement of biochemical markers in body fluids, such as serum, plasma, urine or CSF.

Cerebrospinal fluid biomarkers

For brain disorders such as TBI, the advantage of CSF biomarkers is that the CSF is in direct contact with the brain extracellular fluid, which mirrors biochemical changes in the brain. As reviewed in another article in this issue, the most promising CSF biomarkers for acute TBI are axonal proteins, such as neurofilament light polypeptide and tau.⁶¹ The CSF levels of these proteins probably reflect the extent of axonal damage after acute TBI. Indeed, a marked increase in CSF total tau that correlates with clinical outcome is found in patients after severe TBI.^{64,65}

These biomarkers could be especially important in the evaluation of individuals with mild TBI such as boxers, who endure repeated TBI by head punches during sparring or bouts. Interestingly, a longitudinal study of amateur boxers showed a marked increase in levels of CSF neurofilament light polypeptide, together with a less pronounced increase in tau, after bouts.⁶⁶ The increase in neurofilament light polypeptide was much more pronounced in boxers who sustained several head punches. These biomarker changes seem to be transitory, as CSF neurofilament light polypeptide levels returned to normal levels after a 3-month period of rest from bouts and sparring.⁶⁷ Similar results have been reported in an independent study on Olympic boxers, confirming a direct correlation between increases in

CSF biomarker levels and boxing exposure.⁶⁸ These findings suggest that CSF levels of neurofilament light polypeptide and total tau could be valuable biomarkers for monitoring of axonal damage in boxers (Figure 5) and other TBI cases.

Plasma biomarkers

Given that CSF samples must be obtained by invasive lumbar puncture, availability of biomarkers of brain damage that can be assayed in blood samples would be beneficial. Several protein biomarkers have been examined as potential blood markers of TBI.⁶¹ Of these, serum levels of the glial protein S-100B increased markedly in patients with severe TBI and correlated with clinical outcome.^{69,70} Reports are inconsistent, however, regarding the correlation between serum S-100B levels and intra cranial pathology as evaluated by CT or MRI scans, or clinical outcome in patients with mild TBI.^{69,70} A pilot study found an increase in plasma tau to more than 300% of control levels in amateur boxers following a bout.⁷¹ Tau levels in blood samples might, therefore, serve as a biomarker of mild TBI.

Several factors could contribute to the lack of plasma biomarkers of TBI: first, dilution of the brain-specific protein, both in the large volume of plasma and in the extracellular fluid of peripheral organs; second, degradation of the biomarker candidate by blood proteases; and third, clearance of the protein by hepatic metabolism or renal excretion. Furthermore, analyses of brain proteins in blood can be confounded by release of the same protein from peripheral tissues. For example, S-100B is released from fractured bones and injured skeletal muscles in patients with multiple trauma, thereby reducing the diagnostic power of this marker for TBI.^{69,70} Highly sensitive analytical techniques are needed to detect minute amounts of brain-specific proteins in peripheral blood as biomarkers for mild TBI. Measurement of tau protein in serum samples using a novel ultra-sensitive technique called digital ELISA, which involves single-molecule arrays, has recently been described.⁷² This assay has a limit of detection of 0.02 pg/ml, which is 1000-fold more sensitive than conventional immunoassays, and showed good performance in identifying brain damage in patients who had brain hypoxia following cardiac arrest.⁷² Studies are ongoing to examine whether serum levels of tau could serve as a blood biomarker of mild TBI.

Biomarker applications

Clinical studies of TBI biomarkers in professional contact sports such as boxing and martial arts, American foot ball, ice hockey and rugby, as well as in military personnel at risk of blast overpressure and direct traumatic head injuries, would be particularly valuable. Clinical evaluation and biomarker examination should ideally be performed at baseline (for example, before the football season or before military service in a combat zone) and after TBI. Such studies would provide important information both on pathogenic mechanisms in acute TBI and on the threshold of exposure that is needed to induce detectable neuronal damage.

CSF and other biomarkers of acute TBI could be important tools for medical counselling of concussed athletes and other risk groups, such as military personnel, providing both diagnostic information and prognostic guidance. Post-injury CSF biomarker levels might give information on the severity of axonal damage after a knockout or blast injury, and

follow-up biomarker testing could be used to monitor when active brain-cell lysis has resolved—that is, when CSF biomarker levels return to normal—and, thereby, when athletes can return to their sport, or military personnel to service. Much research is needed before we come to this point in the medical care of patients with acute TBI. The ADNI study, mentioned above, provides an outstanding example of a multicentre, longitudinal study to understand pathogenic mechanisms, their interrelationships and their temporal evolution in AD, which could provide a useful model for future TBI research.⁷³ These studies would not only provide data on the incidence and prevalence of chronic brain disorders, but also improve our understanding of the relationship between acute and long-term sequelae of repetitive TBI.

During life, clinical differentiation between delayed post-traumatic AD and CTE remains a challenge. CSF biomarker analysis or amyloid PET data are not currently available for autopsy-confirmed CTE cases, although the first case report of a negative amyloid scan in a retired National Football League player with the clinical diagnosis of probable CTE has recently been published.⁷⁴ Current amyloid PET ligands detect fibrillar A β plaques, whereas imaging the diffuse A β deposits that are often part of CTE can be challenging. Advances have recently been made in PET imaging of tau, and accumulation of clinical experience with this imaging tool is expected to begin in 2013.^{24,25,75}

Biomarkers would provide information on pathogenic mechanisms and the temporal evolution of different forms of pathology, which would also help to resolve the question of whether pathogenic mechanisms differ between dementia pugilistica and CTE. The temporal-sequence information will be highly informative for development and timing of medical interventions. Lastly, these studies would be important for formulation of widely accepted, evidence-based guidelines for the clinical diagnosis of CTE.

Regulation of contact sports

No treatment is available for dementia pugilistica or CTE, but these conditions—in contrast to most other neurodegenerative disorders—are preventable. In 2005, the World Medical Association (WMA) recommended banning boxing⁷⁶ because of the basic intent of the sport to inflict bodily harm to the opponent. Several alternative ways to make the sport safer exist, including measures to reduce the number of head punches during a bout, use of protective equipment to limit the deleterious effects on the brain of repeated punches, and various approaches to prevent boxers from continuing a potentially dangerous fight, including education and action of the referees.

The tragic death of the professional boxer Kim Duk-Koo in 1982 owing to a subdural haematoma after being knocked out by Ray Mancini in round 14 served as an initiating factor to lower the number of rounds in professional boxing from 15 to 12. Following this change, a trend toward decreased mortality amongst professional boxers has been observed, although this trend might also be related to lower exposure to repetitive head trauma in this group of individuals, with shorter careers and fewer fights.⁷⁷

Impact forces from punches have been studied experimentally, and can be comparable to the impact of a 6-kg bowling ball rolling at 20 mph.⁷⁸ Boxing helmets and gloves reduce the

impact from a punch.⁷⁹ Protective headgear is mandatory in amateur boxing but not in professional boxing or mixed martial arts—a sport that is rising in popularity. Although helmets in sports reduce incidence of superficial facial injury and severe head injury, no clear evidence is available to show that they reduce the risk of concussion.^{80,81} Moreover, although protective equipment might reduce risk of CTE in amateur boxing, knockouts still occur, and around 20% of deaths due to brain damage occur in amateur boxing.⁸² Nevertheless, introduction of thicker gloves and headgear with thicker padding—as recommended by the WMA⁸³—would probably reduce the risk of CTE and concussions.

Several international sports organizations, including the International Olympic Commission (IOC), the Fédération Internationale de Football Association, the International Rugby Board, and the International Ice Hockey Federation, have worked on consensus guidelines on sports-related concussion.⁸¹ These guidelines state that an athlete who shows any symptoms of concussion should be removed from play immediately and evaluated by a physician, and should not be allowed to return to play until symptoms have subsided.^{82–84} As the aim of boxing and martial arts sports is to inflict the opponent acute brain damage that is severe enough to win the bout by knockout, such guidelines are difficult to implement in these sports. Given that amateur boxing is an Olympic sport, this issue could present a delicate problem for the IOC.

Conclusions and future directions

The utility of the diagnosis of CTE remains to be studied and improved. Some researchers have questioned the identity of dementia pugilistica and CTE, given the apathetic clinical picture of the former in contrast to the frequently violent clinical picture of the latter (P. Davies, personal communication). Some individuals involved in organized sport remain unconvinced of the potential seriousness of the problem.⁸⁵

A β plaques are more common in CTE than in acute TBI. The main distinguishing features of CTE are the disproportionate tauopathy relative to the amyloidosis and the concentration of CTE lesions at the base of the gyri. Research on TBI and CTE is aimed at elucidating the neuropathological basis of these differences.⁶³ Laboratory modelling of TBI and CTE should facilitate elucidation of the cellular and molecular changes underlying these phenomena. The brain–skull–spine configurations of current rodent and swine models, however, are limited in their capacity to reflect the situation in humans, calling for design of improved models in other species. Despite this challenge, in the meantime, genetically modified rodent models provide powerful tools for delineation of TBI pathways. Several rodent models of CTE have been reported,^{58,86–93} but have yet to be confirmed. Using AD as a model for CTE progression, the acute phase is predicted to be largely A β -related, whereas the chronic phase may be more A β -independent and tauopathy-driven. Preliminary molecular pathology and experimental pharmacology data, however, suggest that at least some features of the AD model might or might not apply to TBI and CTE.^{87–91} Clearly, more research is required.

The incidence and prevalence of CTE and the role of genetic factors remains to be elucidated.⁹⁴ Long-term follow-up of multiple cohorts of individuals, such as American

football players and soldiers, who have sustained repetitive injuries of undefined number and severity, will be valuable for determination and replication of environmental, genetic and other risk factors that influence the natural history of TBI and CTE. TBI diaries will be helpful in determining the number and severity of head injuries, to allow estimation of cumulative risk of TBI to athletes.

Major clinical⁹⁵ and neuroimaging⁹⁶ efforts are under way, and these programmes will be facilitated by recent plans to place neurologists on the sidelines at National Football League games.⁹⁷ These data can serve as models for prospective studies of the cognitive, neuropsychiatric and motor performance of soldiers, athletes and other exposed populations, and can inform behavioural and pharmacological interventions aimed at prophylaxis and therapy.

A future challenge will be translation of our improved understanding of TBI and CTE pathogenesis into rational, evidence-based changes in regulation of sports by governments and school boards that will minimize the public's exposure to TBI and its chronic neurodegenerative sequelae. In addition, the pathological cascades in TBI and CTE, in both acute and chronic stages, must be understood to enable identification of valid biomarkers and development of treatments.

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References

1. Centers for Disease Control and Prevention. Injury prevention and control: traumatic brain injury. Centers for Disease Control and Prevention; 2012. [online], <http://www.cdc.gov/traumaticbraininjury/statistics.html>
2. DeKosky ST, Ikonomovic MD, Gandy S. Traumatic brain injury—football, warfare, and long-term effects. *N. Engl. J. Med.* 2010; 363:1293–1296. [PubMed: 20879875]
3. US Department of Defense. Traumatic brain injury—Department of Defense special report. US Department of Defense; 2012. [online], http://www.defense.gov/home/features/2012/0312_tbi/
4. Lange, RT.; Brickell, TA.; Ivins, B.; Vanderploeg, R.; French, LM. Variable, not always persistent, postconcussion symptoms following mild TBI in U.S. military service members: a 5-year cross-sectional outcome study.. *J. Neurotrauma.* <http://dx.doi.org/10.1089/neu.2012.2743>
5. Wall PL. Posttraumatic stress disorder and traumatic brain injury in current military populations: a critical analysis. *J. Am. Psychiatr. Nurses Assoc.* 2012; 18:278–298. [PubMed: 23053745]
6. Capehart B, Bass D. Review: managing posttraumatic stress disorder in combat veterans with comorbid traumatic brain injury. *J. Rehabil. Res. Dev.* 2012; 49:789–812. [PubMed: 23015586]
7. Vasterling JJ, et al. Neuropsychological outcomes of mild traumatic brain injury, post-traumatic stress disorder and depression in Iraq-deployed US Army soldiers. *Br. J. Psychiatry.* 2012; 201:186–192. [PubMed: 22743844]
8. Vanderploeg RD, et al. Health outcomes associated with military deployment: mild traumatic brain injury, blast, trauma, and combat associations in the Florida National Guard. *Arch. Phys. Med. Rehabil.* 2012; 93:1887–1895. [PubMed: 22705240]

10. Bazarian JJ, et al. The relation between posttraumatic stress disorder and mild traumatic brain injury acquired during operations enduring freedom and Iraqi freedom. *J. Head Trauma Rehabil.* 2013; 28:1–12. [PubMed: 22647965]
11. Shively SB, Perl DP. Traumatic brain injury, shell shock, and posttraumatic stress disorder in the military—past, present, and future. *J. Head Trauma Rehabil.* 2012; 27:234–239. [PubMed: 22573042]
12. Ruff RL, Riechers RG 2nd, Wang XF, Piero T, Ruff SS. A case-control study examining whether neurological deficits and PTSD in combat veterans are related to episodes of mild TBI. *BMJ Open.* 2012; 2:e000312.
13. Barnes SM, Walter KH, Chard KM. Does a history of mild traumatic brain injury increase suicide risk in veterans with PTSD? *Rehabil. Psychol.* 2012; 57:18–26. [PubMed: 22369114]
14. Bogdanova Y, Verfaellie M. Cognitive sequelae of blast-induced traumatic brain injury: recovery and rehabilitation. *Neuropsychol. Rev.* 2012; 22:4–20. [PubMed: 22350691]
15. Moretti L, et al. Cognitive decline in older adults with a history of traumatic brain injury. *Lancet Neurol.* 2012; 11:1103–1112. [PubMed: 23153408]
16. Shively S, Scher AI, Perl DP, Diaz-Arrastia R. Dementia resulting from traumatic brain injury: what is the pathology? *Arch. Neurol.* 2012; 9:1–7.
17. Sivanandam TM, Thakur MK. Traumatic brain injury: a risk factor for Alzheimer's disease. *Neurosci. Biobehav. Rev.* 2012; 36:1376–1381. [PubMed: 22390915]
18. Esiri MM, Chance SA. Cognitive reserve, cortical plasticity and resistance to Alzheimer's disease. *Alzheimers Res. Ther.* 2012; 4:7. [PubMed: 22380508]
19. Norton MC, et al. Lifestyle behavior pattern is associated with different levels of risk for incident dementia and Alzheimer's disease: the Cache County study. *J. Am. Geriatr. Soc.* 2012; 60:405–412. [PubMed: 22316091]
20. Johnson VE, Stewart W, Smith DH. Widespread τ and amyloid- β pathology many years after a single traumatic brain injury in humans. *Brain Pathol.* 2012; 22:142–149. [PubMed: 21714827]
21. Lehman EJ, Hein MJ, Baron SL, Gersic CM. Neurodegenerative causes of death among retired National Football League players. *Neurology.* 2012; 79:1970–1974. [PubMed: 22955124]
22. Khunk WE, et al. Imaging brain amyloid in Alzheimer's disease with Pittsburgh Compound-B. *Ann. Neurol.* 2004; 55:306–319. [PubMed: 14991808]
23. Clark CM, et al. Use of florbetapir-PET for imaging β -amyloid pathology. *JAMA.* 2011; 305:275–283. [PubMed: 21245183]
24. Zhang W, et al. A highly selective and specific PET tracer for imaging of tau pathologies. *J. Alzheimers Dis.* 2012; 31:601–612. [PubMed: 22683529]
25. Chien, DT., et al. Early clinical PET imaging results with the novel PHF-tau radioligand [F-18]-T807.. *J. Alzheimers Dis.* <http://dx.doi.org/10.3233/JAD-122059>
26. Ciallella JR, et al. Changes in expression of amyloid precursor protein and interleukin-1 β after experimental traumatic brain injury in rats. *J. Neurotrauma.* 2002; 19:1555–1567. [PubMed: 12542857]
27. Ikonomovic MD, et al. Alzheimer's pathology in human temporal cortex surgically excised after severe brain injury. *Exp. Neurol.* 2004; 190:192–203. [PubMed: 15473992]
28. DeKosky ST, et al. Association of increased cortical soluble $A\beta_{42}$ levels with diffuse plaques after severe brain injury in humans. *Arch. Neurol.* 2007; 64:541–544. [PubMed: 17420316]
29. Nicoll JA, Roberts GW, Graham DI. Apolipoprotein E e4 allele is associated with deposition of amyloid β -protein following head injury. *Nat. Med.* 1995; 1:135–137. [PubMed: 7585009]
30. Jordan BD, et al. Apolipoprotein E ϵ 4 associated with chronic traumatic brain injury in boxing. *JAMA.* 1997; 278:136–140. [PubMed: 9214529]
31. Jordan, BD. Clinical spectrum of sports-related traumatic brain injury.. *Nat. Rev. Neurol.* <http://dx.doi.org/10.1038/nrneurol.2013.33>
32. Horsburgh K, et al. β -amyloid ($A\beta$)42(43), $\alpha\beta$ 42, $\alpha\beta$ 40 and apoE immunostaining of plaques in fatal head injury. *Neuropathol. Appl. Neurobiol.* 2000; 26:124–132. [PubMed: 10840275]
33. Johnson VE, et al. A neprilysin polymorphism and amyloid- β plaques after traumatic brain injury. *J. Neurotrauma.* 2009; 26:1197–1202. [PubMed: 19326964]

34. Factor SA, Weiner WJ. Prior history of head trauma in Parkinson's disease. *Mov. Disord.* 1991; 6:225–229. [PubMed: 1922127]
35. Rubjerg K, Ritz B, Korbo L, Martinussen N, Olsen JH. Risk of Parkinson's disease after hospital contact for head injury: population based case-control study. *BMJ.* 2008; 337:a2494. [PubMed: 19074944]
36. Corsellis JA, Brierley JB. Observations on the pathology of insidious dementia following head injury. *J. Ment. Sci.* 1959; 105:714–720. [PubMed: 13812088]
37. Corsellis JA. Boxing and the brain. *BMJ.* 1989; 298:105–109. [PubMed: 2493277]
38. Roberts GW, Allsop D, Bruton C. The occult aftermath of boxing. *J. Neurol. Neurosurg. Psychiatry.* 1990; 53:373–378. [PubMed: 2191084]
39. Tokuda T, Ikeda S, Yanagisawa N, Ihara Y, Glenner GG. Re-examination of ex-boxers' brains using immunohistochemistry with antibodies to amyloid β -protein and tau protein. *Acta Neuropathol.* 1991; 82:280–285. [PubMed: 1759560]
40. McKee AC, et al. Chronic traumatic encephalopathy in athletes: progressive tauopathy after repetitive head injury. *J. Neuropathol. Exp. Neurol.* 2009; 68:709–735. [PubMed: 19535999]
41. Gandy S, DeKosky ST. APOE e4 status and traumatic brain injury on the gridiron or the battlefield. *Sci. Transl. Med.* 2012; 4:134ed4.
42. Gandy S. The role of cerebral amyloid β accumulation in common forms of Alzheimer disease. *J. Clin. Invest.* 2005; 115:1121–1129. [PubMed: 15864339]
43. Gandy S, DeKosky ST. Toward the treatment and prevention of Alzheimer's disease: rational strategies and recent progress. *Annu. Rev. Med.* 2013; 64:367–383. [PubMed: 23327526]
44. Guskiewicz KM, et al. Association between recurrent concussion and late-life cognitive impairment in retired professional football players. *Neurosurgery.* 2005; 57:719–726. [PubMed: 16239884]
45. Omalu BI, et al. Chronic traumatic encephalopathy in a National Football League player. *Neurosurgery.* 2005; 57:128–134. [PubMed: 15987548]
46. Yi J, Padalino DJ, Chin LS, Montenegro P, Cantu RC. Chronic traumatic encephalopathy. *Curr. Sports Med. Rep.* 2013; 12:28–32. [PubMed: 23314081]
47. Clark EC, Harper EO. Electroencephalographic findings in 186 cases of chronic post traumatic encephalopathy. *Electroencephalogr. Clin. Neurophysiol.* 1951; 3:9–14.
48. McKee AC, et al. The spectrum of disease in chronic traumatic encephalopathy. *Brain.* 2013; 136:43–64. [PubMed: 23208308]
49. Omalu BI, Hamilton RL, Kamboh MI, DeKosky ST, Bailes J. Chronic traumatic encephalopathy (CTE) in a National Football League Player: case report and emerging medicolegal practice questions. *J. Forensic Nurs.* 2010; 6:40–46. [PubMed: 20201914]
50. Omalu BI, Bailes J, Hammers JL, Fitzsimmons RP. Chronic traumatic encephalopathy, suicides and parasuicides in professional American athletes: the role of the forensic pathologist. *Am. J. Forensic Med. Pathol.* 2010; 31:130–132. [PubMed: 20032774]
51. Omalu BI, Fitzsimmons RP, Hammers J, Bailes J. Chronic traumatic encephalopathy in a professional American wrestler. *J. Forensic. Nurs.* 2010; 6:130–136. [PubMed: 21175533]
52. Omalu B, et al. Emerging histomorphologic phenotypes of chronic traumatic encephalopathy in American athletes. *Neurosurgery.* 2011; 69:173–183. [PubMed: 21358359]
53. Dwyre, B. Dave Duerson's suicide could be a turning point for the NFL. Los Angeles Times; Feb 21. 2011 <http://articles.latimes.com/2011/feb/21/sports/la-sp-dwyre-20110222>
54. Nelson, E.; Sherwood, R. Chris Benoit's murder, suicide: was brain damage to blame?. ABC News; Aug 26. 2010 <http://abcnews.go.com/Nightline/chris-benoits-dad-son-suffered-severe-brain-damage/story?id=11471875>
55. Tierny, M. Football player who killed himself had brain disease. Vol. B16. New York Times; Jul 27. 2012
56. Kounang, N.; Smith, S. Seau had brain disease that comes from hits to head, NIH finds. CNN; Jan 11. 2013 <http://www.cnn.com/2013/01/10/health/seau-brain-disease/index.html>
57. Omalu B, et al. Chronic traumatic encephalopathy in an Iraqi war veteran with posttraumatic stress disorder who committed suicide. *Neurosurg. Focus.* 2011; 31:E3. [PubMed: 22044102]

58. Goldstein LE, et al. Chronic traumatic encephalopathy in blast-exposed military veterans and a blast neurotrauma mouse model. *Sci. Transl. Med.* 2012; 14:134ra60.
59. Fagan AM, et al. Cerebrospinal fluid tau/β-amyloid₄₂ ratio as a prediction of cognitive decline in nondemented older adults. *Arch. Neurol.* 2007; 64:343–349. [PubMed: 17210801]
60. Cairns NJ, et al. Absence of Pittsburgh compound B detection of cerebral amyloid β in a patient with clinical, cognitive, and cerebrospinal fluid markers of Alzheimer disease: a case report. *Arch. Neurol.* 2009; 66:1557–1562. [PubMed: 20008664]
61. Zetterberg, H.; Smith, DH.; Blennow, K. Biomarkers of mild traumatic brain injury in cerebrospinal fluid and blood.. *Nat. Rev. Neurol.* <http://dx.doi.org/10.1038/nrneurol.2013.9>
62. Ikonomovic MD, et al. Post-mortem correlates of in vivo PiB-PET amyloid imaging in a typical case of Alzheimer's disease. *Brain.* 2008; 131:1630–1645. [PubMed: 18339640]
63. Povlishock JT, Becker DP, Cheng CL, Vaughan GW. Axonal change in minor head injury. *J. Neuropathol. Exp. Neurol.* 1983; 42:225–242. [PubMed: 6188807]
64. Franz G, et al. Amyloid beta 1–42 and tau in cerebrospinal fluid after severe traumatic brain injury. *Neurology.* 2003; 60:1457–1461. [PubMed: 12743231]
65. Öst M, et al. Initial CSF total tau correlates with 1-year outcome in patients with traumatic brain injury. *Neurology.* 2006; 67:1600–1604. [PubMed: 17101890]
66. Zetterberg H, et al. Neurochemical aftermath of amateur boxing. *Arch. Neurol.* 2006; 63:1277–1280. [PubMed: 16966505]
67. Neselius S, et al. CSF-biomarkers in Olympic boxing: diagnosis and effects of repetitive head trauma. *PLoS ONE.* 2012; 7:e33606. [PubMed: 22496755]
68. Kövesdi E, et al. Update on protein biomarkers in traumatic brain injury with emphasis on clinical use in adults and pediatrics. *Acta Neurochir. (Wien).* 2010; 152:1–17. [PubMed: 19652904]
69. Naeimi ZS, Weinhofer A, Sarahrudi K, Heinz T, Vecsei V. Predictive value of S-100B protein and neuron specific-enolase as markers of traumatic brain damage in clinical use. *Brain Inj.* 2006; 20:463–468. [PubMed: 16716992]
70. Anderson RE, Hansson LO, Nilsson O, Dijlai-Merzouq R, Settergren G. High serum S100B levels for trauma patients without head injuries. *Neurosurgery.* 2001; 48:1255–1258. [PubMed: 11383727]
71. Neselius S, et al. Olympic boxing is associated with elevated levels of the neuronal protein tau in plasma. *Brain Inj.* (in press).
72. Randall, J., et al. Tau proteins in serum predict neurological outcome after hypoxic brain injury from cardiac arrest: results of a pilot study.. *Resuscitation.* <http://dx.doi.org/10.1016/j.resuscitation.2012.07.027>
73. Weiner MW, et al. The Alzheimer's Disease Neuroimaging Initiative: a review of papers published since its inception. *Alzheimers Dement.* 2012; 8(Suppl. 1):S1–S68. [PubMed: 22047634]
74. Mitsis, E., et al. Florbetapir scanning excludes Alzheimer's disease in a retired NFL player with delayed cognitive impairment.. Presented at the 7 th Human Amyloid Imaging Conference; http://www.scribd.com/doc/117537451/HAI-2013-ConferenceBook#outer_page_83
75. Fodero-Tavoletti MT, et al. ¹⁸F-THK523: a novel in vivo tau imaging ligand for Alzheimer's disease. *Brain.* 2011; 134:1089–1100. [PubMed: 21436112]
76. World Medical Association. WMA statement on boxing. WMA; 2013. [online], <http://www.wma.net/en/30publications/10policies/b6/index.htm>
77. Baird LC, et al. Mortality resulting from head injury in professional boxing. *Neurosurgery.* 2010; 67:1444–1450. [PubMed: 20948404]
78. Atha J, Yeadon MR, Sandover J, Parsons KC. The damaging punch. *Br. Med. J.* 1985; 291:1756–1757. [PubMed: 3936571]
79. Bartsch AJ, Benzel EC, Miele VJ, Morr DR, Prakash V. Boxing and mixed martial arts: preliminary traumatic neuromechanical injury risk analyses from laboratory impact dosage data. *J. Neurosurg.* 2012; 116:1070–1080. [PubMed: 22313361]
80. Jako P. Safety measures in amateur boxing. *Br. J. Sports Med.* 2002; 36:394–395. [PubMed: 12453832]

- NIH-PA Author Manuscript
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- NIH-PA Author Manuscript
- NIH-PA Author Manuscript
81. McCrory P, et al. Consensus statement on concussion in sport—the Third International Conference on Concussion in Sport held in Zurich, November 2008. *Phys. Sportsmed.* 2009; 37:141–159. [PubMed: 20048521]
 82. Svinth, JR. Death Under the Spotlight: The Manuel Velazquez Boxing Fatality Collection.. *Electronic Journals of Martial Arts and Sciences.* 2007. [online], http://ejmas.com/jcs/jcsartsvinth_a_0700.htm
 83. Miele VJ, Bailes JE. Objectifying when to halt a boxing match: a video analysis of fatalities. *Neurosurgery.* 2007; 60:307–315. [PubMed: 17290181]
 84. Cantu RC. Return to play guidelines after a head injury. *Clin. Sports Med.* 1998; 17:45–60. [PubMed: 9475970]
 85. Epstein, D. Conclusions? Too early.. *Sports Illustrated.* Jan 21, 2013 <http://sportsillustrated.cnn.com/vault/article/magazine/MAG1206738/index.htm>
 86. Abrahamson EE, Ikonomovic MD, Dixon CE, DeKosky ST. Simvastatin therapy prevents brain trauma-induced increases in β -amyloid peptide levels. *Ann. Neurol.* 2009; 66:407–414. [PubMed: 19798641]
 87. Loane DJ, et al. Amyloid precursor protein secretases as therapeutic targets for traumatic brain injury. *Nat. Med.* 2009; 15:377–379. [PubMed: 19287391]
 88. Tran HT, Sanchez L, Brody DL. Inhibition of JNK by a peptide inhibitor reduces traumatic brain injury-induced tauopathy in transgenic mice. *J. Neuropathol. Exp. Neurol.* 2012; 71:116–129. [PubMed: 22249463]
 89. Magnoni S, et al. Tau elevations in the brain extracellular space correlate with reduced amyloid- β levels and predict adverse clinical outcomes after severe traumatic brain injury. *Brain.* 2012; 135:1268–1280. [PubMed: 22116192]
 90. Tran HT, Sanchez L, Esparza TJ, Brody DL. Distinct temporal and anatomical distributions of amyloid- β and tau abnormalities following controlled cortical impact in transgenic mice. *PLoS ONE.* 2011; 6:e25475. [PubMed: 21980472]
 91. Tran HT, LaFerla FM, Holtzman DM, Brody DL. Controlled cortical impact traumatic brain injury in 3xTg-AD mice causes acute intra- axonal amyloid- β accumulation and independently accelerates the development of tau abnormalities. *J. Neurosci.* 2011; 29:9513–9525. [PubMed: 21715616]
 92. Garman RH, et al. Blast exposure in rats with body shielding is characterized primarily by diffuse axonal injury. *J. Neurotrauma.* 2011; 28:947–959. [PubMed: 21449683]
 93. Ojo JO, et al. Repetitive mild traumatic brain injury augments tau pathology and glial activation in aged hTau mice. *J. Neuropathol. Exp. Neurol.* 2013; 72:137–151. [PubMed: 23334597]
 94. Blennow K, Hardy J, Zetterberg H. The neuropathology and neurobiology of traumatic brain injury. *Neuron.* 2012; 76:886–899. [PubMed: 23217738]
 95. Smith, S. NFL players association, Harvard planning \$100 million player study. CNN; Jan 30, 2013 <http://www.cnn.com/2013/01/29/health/nfl-harvard-study/index.html>
 96. Battista, J. NFL joins with GE in effort to detect concussions. Vol. SP6. New York Times; Feb 3, 2013
 97. NFL expects to soon have neurological consultants on sidelines.. National Football League. Jan 31, 2013 [No authors listed] [online], <http://www.nfl.com/news/story/0ap100000133506/article/nfl-expects-to-soon-have-neurological-consultants-on-sidelines>

Key points

- Traumatic brain injury (TBI) can lead to delayed-onset neurodegenerative syndromes that include Alzheimer disease (AD) and chronic traumatic encephalopathy (CTE)
- CTE has gained attention owing to increasing media coverage of neuropsychiatric dysfunction in players of high-impact sport, such as boxing and American football
- Brain pathology after single-incident severe TBI is similar to early amyloid pathology in AD, whereas repetitive TBI can produce tauopathy with or without amyloidosis that resembles pathology of boxers' dementia
- Estimation of the risk and prevalence of CTE remains challenging, and accurate prediction of TBI outcome and CTE risk for soldiers and players of high-impact sports is not yet possible
- Several genetic risk factors for CTE have been proposed but remain to be established
- Cerebrospinal fluid and neuroimaging biomarkers of TBI and CTE are emerging and hold promise for antemortem diagnosis of CTE, prediction of CTE risk, and monitoring of neuropathology progression

Review criteria

Literature on dementia pugilistica and chronic traumatic brain injury published since 1950 was accessed via Internet-wide and database searches of both public and academic literature (that is, PubMed, PubMedCentral and MEDLINE). The search terms “brain trauma”, “brain injury”, and “dementia pugilistica” were used for broad searches, which were then narrowed by manual inspection. Reference lists from recent reviews of the topic were scanned for additional leads.

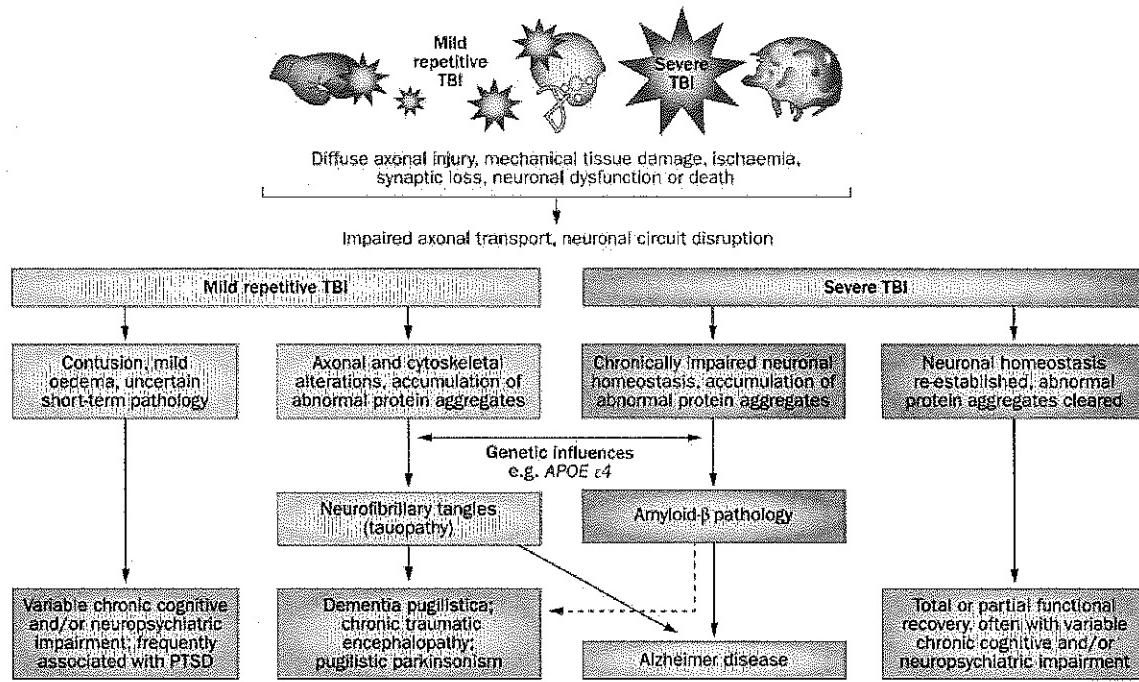
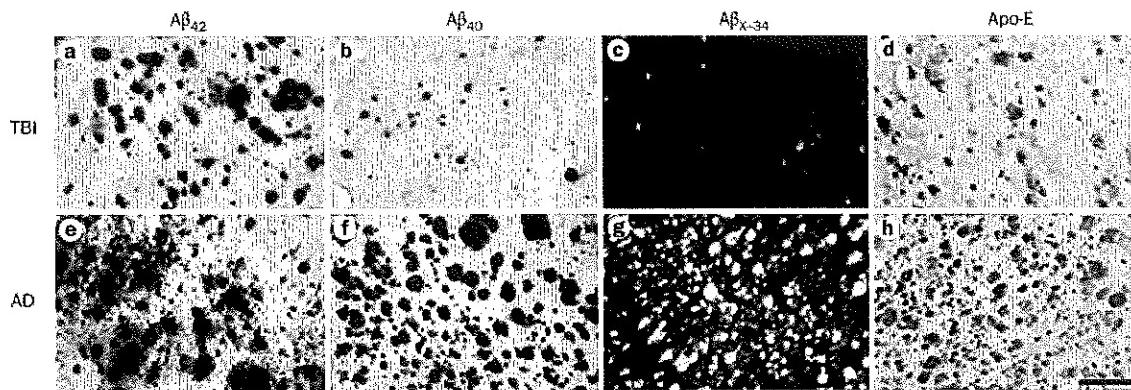
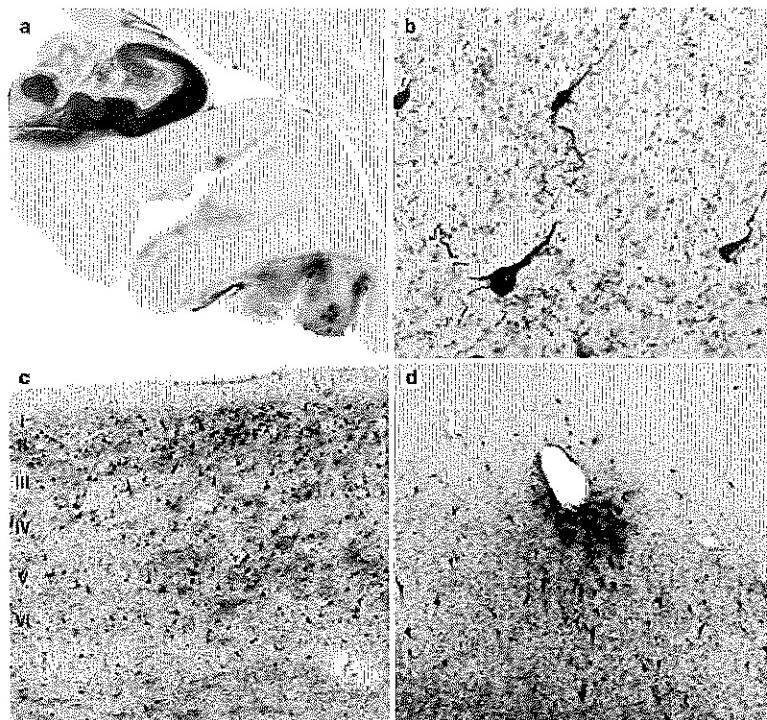


Figure 1.

Spectrum of pathological features and outcomes of mild and severe TBI. Abbreviations: *APOE*, apolipoprotein E; PTSD, post-traumatic stress disorder; TBI, traumatic brain injury.

**Figure 2.**

Histopathology of the temporal cortex in TBI and AD. Brain sections from **a–d** | an individual with severe acute TBI and **e–h** | a patient with AD are labelled for A β ₄₂ (**a,e**), A β ₄₀ (**b,f**), A β _{X-34} (**c,g**), or Apo-E (**d,h**). In the TBI case, A β ₄₂ plaques (**a**) are more abundant than A β ₄₀ plaques (**b**). Frequency of plaques with A β _{X-34} (**c**) is closer to that of A β ₄₀, whereas distribution of Apo-E-positive plaques (**d**) is similar to A β ₄₂ plaques. The AD temporal cortex shows profusion of all plaque types (**e–h**), as well as neurofibrillary tangles, neuropil threads, and vascular amyloidosis (**g**). Scale bar: 200 μ m. Abbreviations: A β , amyloid- β ; AD, Alzheimer disease; Apo-E, apolipoprotein E; TBI, traumatic brain injury. Permission obtained from Elsevier Ltd © Ikonomovic, M. D. et al. *Exp. Neurol.* **190**, 192–203 (2004).

**Figure 3.**

Histopathological features of chronic traumatic encephalopathy in a former professional football player. All sections are immunostained for abnormally phosphorylated tau using an AT-8 monoclonal antibody that detects hyperphosphorylated tau (Ser202 and Thr205). **a** | Scanning view of the hippocampus and parahippocampal cortex. Note intense immunostaining of the entire Ammon horn and subiculum, with focal involvement at the depths of sulci of the inferior temporal lobe. Original magnification $\times 1$. **b** | Appearance of individual neurofibrillary tangles in the neocortex. Original magnification $\times 160$. **c** | Neurofibrillary tangles in the anterior insular cortex form preferentially in the superficial layers (layers II–III), rather than in deeper layers (layers V–VI) as is more common in Alzheimer disease. Original magnification $\times 30$. **d** | Tendency for perivascular tau deposition and neurofibrillary tangle formation in the frontal cortex. Original magnification $\times 60$. Permission obtained from the American Medical Association © Shively, S. et al. *Arch. Neurol.* **69**, 1245–1251 (2012).

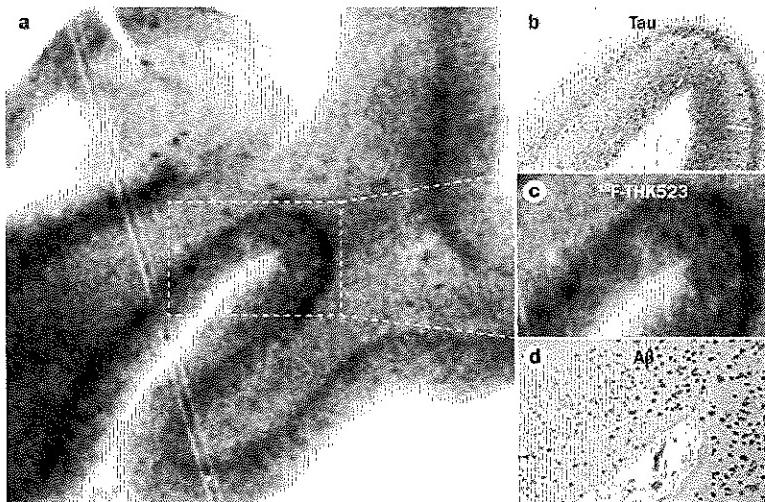
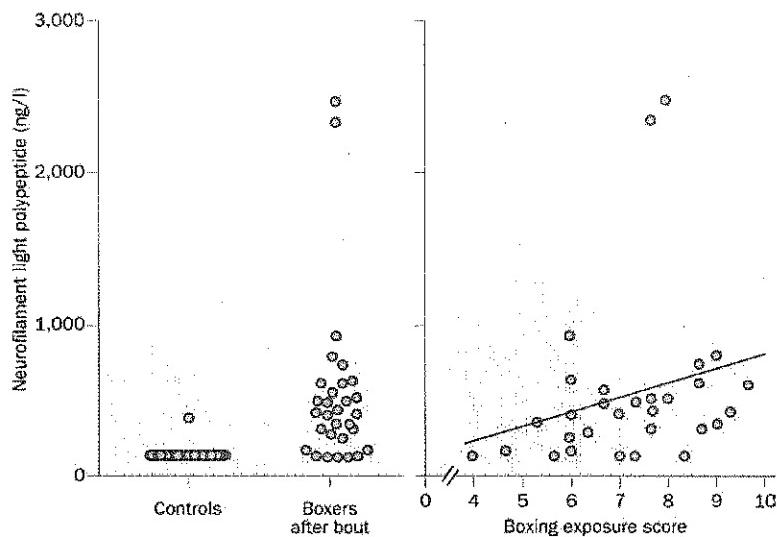


Figure 4.
 ^{18}F -THK523 as a tauopathy marker. Autoradiography and microscopy analysis of hippocampal serial sections taken at autopsy from a 90-year-old patient with Alzheimer disease indicates that ^{18}F -THK523 binds specifically to tau tangles, with no detectable binding to A β plaques. **a** | Low-magnification ^{18}F -THK523 autoradiogram. **b–d** | Higher-magnification microscopy and autoradiogram images of three serial sections immunostained with antibodies to tau (b), which label neurofibrillary tangles; with ^{18}F -THK523 (c); or with antibodies to A β (d), which label A β plaques. ^{18}F -THK523 labelling seems to colocalize with tau immunostaining of neurofibrillary tangles, but not with plaques. Abbreviation: A β , amyloid- β . Permission obtained from Oxford University Press © Fodero-Tavoletti, M. T. *et al. Brain* **134**, 1089–1100 (2011).

**Figure 5.**

CSF neurofilament light polypeptide in Olympic boxers after a bout. **a** | Individual CSF levels of neurofilament light polypeptide—a biomarker of axonal damage—in boxers after a bout and in age-matched controls. 25 of 30 (83%) of boxers had high CSF neurofilament light polypeptide levels, whereas 24 of 25 (96%) of controls had normal levels (below 125 ng/l), Wilcoxon signed rank test: $P < 0.001$. **b** | Correlation between boxing exposure and CSF neurofilament light polypeptide levels. A lower score indicates fewer and easier fights, whereas higher scores indicate more, tougher fights with more head blows. Spearman's $r = 0.40$; $P = 0.03$. Abbreviation: CSF, cerebrospinal fluid. Figure is reproduced from Neselius, S. et al. *PLoS ONE* 7, e33606 (2012), which is published under an open-access license by the Public Library of Science.

**UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA**

IN RE: NATIONAL FOOTBALL LEAGUE
PLAYERS' CONCUSSION INJURY
LITIGATION

No. 2:12-md-02323-AB
MDL No. 2323

Kevin Turner and Shawn Wooden,
*on behalf of themselves and
others similarly situated,*

Plaintiffs,

v.

National Football League and
NFL Properties, LLC,
successor-in-interest to
NFL Properties, Inc.,

Defendants.

THIS DOCUMENT RELATES TO:
ALL ACTIONS

DECLARATION OF Patrick R. Hof, MD

Patrick R. Hof affirms under penalty of perjury the truth of the following facts:

1. I am the Regenstreif Professor of Neuroscience at the Icahn School of Medicine at Mount Sinai, New York. My *curriculum vitae* is attached as Exhibit A.
2. I have been asked to submit this declaration in support of the objection to the proposed class action settlement in the above captioned case filed by the MoloLamken LLP law firm. I am not being compensated for my work in doing so.
3. Chronic traumatic encephalopathy (or CTE) is a unique neurodegenerative disease that is known to exist outside of ALS, Alzheimer's disease, or Parkinson's disease.
4. Repetitive brain trauma is a necessary condition for developing CTE.

5. ALS, Alzheimer's disease, and Parkinson's disease are found in the general population of individuals who have not suffered repetitive brain trauma. Suicidality does not present as a symptom of these diseases.

6. Mood and behavioral impairments such as depression, suicidality, hopelessness, impulsivity, explosiveness, rage, and aggression, although present in the general population, appear more frequently in individuals suffering from CTE than in the general population.

7. The mood and behavioral impairments associated with CTE can present prior to the onset of CTE-related dementia and can be the cause of significant disability and distress for the patient.

8. Based on my experience and knowledge of the clinical and scientific literature, I believe that a reliable, valid, and clinically accepted diagnosis of CTE, based, in part, on objective biomarkers, will likely be possible in the next decade, if not sooner, and long before the 65-year term of the proposed NFL Concussion Litigation Settlement expires.

9. I am not aware of the use of the diagnostic or classification categories of "Neurocognitive Impairment Level 1.0," "Neurocognitive Impairment Level 1.5," or "Neurocognitive Impairment Level 2.0" anywhere in the medical or scientific community.

Pursuant to 28 U.S.C. § 1746, I state under penalty of perjury that the foregoing is true and correct.



Dated: November 25, 2014

Patrick R. Hof, MD

Exhibit A

CURRICULUM VITAE

PATRICK R. HOF, MD

Date of Birth: August 25, 1960, Geneva, Switzerland
 Citizenship: Geneva, Switzerland
 Visa status: Permanent Resident in the USA
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 Private address: 203-12 West Shearwater Court, Jersey City, NJ 07305, USA
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EDUCATION

- 1979 Humanities (classical studies, BA degree),
 College Calvin, Geneva, Switzerland
- 1985 Swiss Federal Medical Diploma (MBBCh degree),
 University of Geneva School of Medicine, Switzerland
- 1987 Medical Doctorate (MD degree),
 University of Geneva School of Medicine, Switzerland

Spoken languages: French, English, German

FIELDS OF INTEREST

Experimental neuropathology, brain aging, dementia, autism, schizophrenia
 Functional anatomy of the cerebral cortex, comparative neuroanatomy
 Brain evolution, primate aging biology, marine mammals biology
 Computer-assisted morphometry, stereology, advanced confocal and electron microscopy
 Magnetic resonance microscopy, functional brain imaging

PROFESSIONAL TRAINING

- 1982-1985 Intern, Department of Pharmacology, University of Geneva, Switzerland
- 1985-1987 Assistant, Department of Pharmacology, University of Geneva, Switzerland
- 1987-1989 Postgraduate Fellow, Division of Preclinical Neuroscience and Endocrinology,
 Research Institute of Scripps Clinic, La Jolla, USA
- 1989-1990 Senior Research Associate, Fishberg Research Center for Neurobiology,
 Mount Sinai School of Medicine, New York, USA

ACADEMIC APPOINTMENTS

1990-1999	Assistant Professor of Neurobiology (1990), Geriatrics (1991), and Ophthalmology (1996), Fishberg Research Center for Neurobiology, Department of Geriatrics and Adult Development, and Department of Ophthalmology, Mount Sinai School of Medicine, New York, USA
1997-1999	Assistant Professor, Kastor Neurobiology of Aging Laboratories, Mount Sinai School of Medicine, New York, USA
1999-2002	Associate Professor of Neurobiology, Geriatrics, and Ophthalmology, Kastor Neurobiology of Aging Laboratories, Fishberg Research Center for Neurobiology, Department of Geriatrics and Adult Development, and Department of Ophthalmology, Mount Sinai School of Medicine, New York, USA
2000-2009	Co-Director, Computational Neurobiology and Imaging Center, Mount Sinai School of Medicine, New York, USA
2002-2007	Member, Advanced Imaging Program, Mount Sinai School of Medicine, New York, USA
2002-present	Irving and Dorothy Regenstreif Research Professor of Neuroscience (Neurobiology), Icahn School of Medicine at Mount Sinai, New York, USA
2002-2005	Tenured Associate Professor of Neuroscience, Departments of Neuroscience, Geriatrics and Adult Development, and Ophthalmology, Mount Sinai School of Medicine, New York, USA
2005-present	Tenured Professor of Neuroscience, Departments of Neuroscience, Geriatrics and Palliative Medicine, and Ophthalmology, Icahn School of Medicine at Mount Sinai, New York, USA
2006-present	Vice-Chair for Translational Neuroscience (and Acting Chair, 2008), Department of Neuroscience, Icahn School of Medicine at Mount Sinai, New York, USA
2007-present	Associate Director, Alzheimer's Disease Research Center, Icahn School of Medicine at Mount Sinai, New York, USA
2008-present	Director, the Kastor Neurobiology of Aging Laboratories and Center of Excellence on Brain Aging, Friedman Brain Institute, Icahn School of Medicine at Mount Sinai, New York, USA
2009-present	Director, Computational Neurobiology and Imaging Center, Icahn School of Medicine at Mount Sinai, New York, USA
2009-present	Director, Laboratory of Neuromorphology, Icahn School of Medicine at Mount Sinai, New York, USA
2011-present	Vice-Chair for Mentoring, Department of Neuroscience, Icahn School of Medicine at Mount Sinai, New York, USA
2013-present	Director, Physician Scholars Program, Graduate School of Biomedical Sciences at Mount Sinai, New York, USA
1992-1999	Doctoral Faculty, The Graduate School and University Center, City University of New York, NY
1992-1997	Visiting Scientist, Laboratory of Memory and Cognition, National Institutes of Mental Health, Bethesda, MD
1992-2003	Affiliated Teaching Faculty, City College, City University of New York, NY
2003-present	Visiting Research Collaborator, Department of Molecular Biology, Princeton University, Princeton, NJ
2006-2008	Visiting Professor, Department of Psychiatry and Neuropsychology, Maastricht University, Maastricht, The Netherlands
2009-present	Member, UCSD/Salk Center for Academic Research and Training in Anthropogeny, La Jolla, CA
2011-present	Adjunct Professor, Department of Anatomy, Ludwig-Maximilians University, Munich, Germany

1991-1996	Member, Geriatric Fellows Research Committee, Department of Geriatrics and Adult Development, Mount Sinai School of Medicine, New York
1995-2007	Member (<i>ex officio</i> since 2007), Institutional Animal Care and Use Committee (IACUC), Mount Sinai School of Medicine, New York
1999-2000	Member, Search Committee for a Director of the Center for Comparative Medicine and Surgery, Mount Sinai School of Medicine, New York
2000	Member, Schizophrenia Search Committee, Department of Psychiatry, Mount Sinai School of Medicine, New York
2000	Member, Institute for Translational Research Programming Committees, Animal Care Subcommittee, Mount Sinai School of Medicine, New York
2001	Member, Task Force on Reconstruction of the Center for Comparative Medicine and Surgery, Mount Sinai School of Medicine, New York
2001-2004	Member, Graduate School Biostatistics Committee, Mount Sinai School of Medicine, New York
2001-2007	Member, Advisory Board of the Advanced Imaging Program, Mount Sinai School of Medicine, New York
2002-2011	Member (<i>ex officio</i> since 2011), Committee on Special Awards, Mount Sinai School of Medicine, New York
2002-present	<i>Ad hoc</i> Member, Medical Scientist Training Program Admissions Committee, Icahn School of Medicine at Mount Sinai, New York
2002-2003	Member, Biostatistics Search Committee, Mount Sinai School of Medicine, New York
2003	Member, Liaison Committee on Medical Education, Subcommittee IV of the Self-Study Task Force, Mount Sinai School of Medicine, New York
2003	Member, Neuroscience Workgroup, Strategic Initiatives Planning, Mount Sinai School of Medicine, New York
2003	Member, Basic Sciences Faculty Advisory Group to the Dean, Mount Sinai School of Medicine, New York
2003-2005	Member, Neuroscience Search Committee, Mount Sinai School of Medicine, New York
2003-2005	Member, Tenured Faculty Steering Committee, Mount Sinai School of Medicine, New York
2004-present	<i>Ad hoc</i> Member, Graduate Program in Biological Sciences Admissions Committee, Icahn School of Medicine at Mount Sinai, New York
2005-2006	Member, Chair of the Department of Psychiatry Search Committee, Mount Sinai School of Medicine, New York
2005-2007	Member, Scientific Advisory Committee, In Vivo Molecular Imaging Research Facility, Mount Sinai School of Medicine, New York
2006-2012	Member, Steering Committee of the Graduate School of Biological Sciences, Mount Sinai School of Medicine, New York
2006-2007	Member, Imaging Facilities and CMS Building Operations Committees, Mount Sinai School of Medicine, New York
2006-2010	Member, Faculty Council Awards Selection Committee, Mount Sinai School of Medicine, New York
2006-present	Member, Appointments and Promotions Committee, Icahn School of Medicine at Mount Sinai, New York
2007-present	Member, Committee on International Affairs, Icahn School of Medicine at Mount Sinai, New York
2007	Member, Subcommittee on Advising, Graduate School of Biological Sciences, Mount Sinai School of Medicine, New York

2008	Member, Subcommittee on Teaching Resources, Graduate School of Biological Sciences, Mount Sinai School of Medicine, New York
2008-present	Member, Executive Committee, Translational and Molecular Imaging Institute, Icahn School of Medicine at Mount Sinai, New York
2008-present	Member, Selection Committee, Medical School Admissions, Icahn School of Medicine at Mount Sinai, New York, USA
2008-2009	Member, Translational Neuroimaging Search Committee, Mount Sinai School of Medicine, New York
2008-2009	Chair, Neuroscience Search Committee, Mount Sinai School of Medicine, New York
2008-2009	Member, Chair of the Department of Neurology Search Committee, Mount Sinai School of Medicine, New York
2008-2009	Member, Chair of the Department of Psychiatry Search Committee, Mount Sinai School of Medicine, New York
2008-2009	Member, Investigation of Scientific Misconduct Committee, Mount Sinai School of Medicine, New York
2009-present	Member, Advisory Committee for the Biorepository Cooperative/Histology Shared Resource Facility, Icahn School of Medicine at Mount Sinai, New York
2009-present	Member, Director of Brain Imaging Search Committee, Icahn School of Medicine at Mount Sinai, New York
2009-present	Member, Friedman Brain Institute Faculty Search Committee, Icahn School of Medicine at Mount Sinai, New York
2009-2011	Chair, Neurocomputing Search Committee, Mount Sinai School of Medicine, New York
2010-2012	Member, Neuropathology Director Search Committee, Icahn School of Medicine at Mount Sinai, New York
2011	Chair, Committee on Publications and Authorships, Mount Sinai School of Medicine, New York
2012-present	Member, Diversity Council (Chair, Data Committee), Icahn School of Medicine at Mount Sinai, New York
2012	Member, Alzheimer's Disease Research Search Committee, Icahn School of Medicine at Mount Sinai, New York
2013-present	Member, Advisory Committee for the Brain Bank, Icahn School of Medicine at Mount Sinai, New York
2014-present	Member, Master's in Biological Sciences Admissions Committee, Icahn School of Medicine at Mount Sinai, New York

HONORS

1988	"Prix de la Faculté de Médecine" Award from the University of Geneva School of Medicine for the best thesis published in 1987
1991	Nominated Brookdale National Fellow
1992	Young Scientist Award from the Swiss Society for Biological Psychiatry Moore Award from the American Association of Neuropathologists
1995	Elected to the Western Pacific Neurological Society (Guam, Mariana Islands) National Glaucoma Research Award from the American Health Assistance Foundation
1999	Nominated Brookdale Senior Fellow Elected to the New York Consortium in Evolutionary Primatology Elected to the LJB&T Club
2001	Appointed Curator of the Morgane-Jacobs-Glezer marine mammals brain collection

2002	Named Irving and Dorothy Regenstreif Research Professor of Neuroscience (Neurobiology), Mount Sinai School of Medicine, New York, NY
2006-2008	Appointed Visiting Professor, Maastricht University, The Netherlands
2008	James Arthur Lecturer, the American Museum of Natural History, New York, NY
2011	Elizabeth Dunaway Burnham Visiting Lecturer, Dartmouth University, Dartmouth, NH
2011	Appointed Adjunct Professor, Ludwig-Maximilians University, München, Germany
2011	Appointed Editor-in-Chief of the Journal of Comparative Neurology
2012	Appointed to the Board of the Cajal Club, Irvine, CA
2013	Recipient of the Faculty Council Award for Academic Excellence by a Senior Faculty Member, Icahn School of Medicine at Mount Sinai, New York, NY Elected Member of the Dana Alliance for Brain Initiatives, New York, NY

FUNDING SOURCES

1986-1987	Center for Medical Research Carlos and Elsie de Reuter Foundation: <i>Neurotransmission and epilepsy: cerebral energy metabolism in epileptic mouse mutants</i> , \$25,000
1987-1988	Swiss National Scientific Research Foundation, Young Scientist Fellowship 83.495.0.87: <i>Immunohistochemical analysis of neuronal markers in Alzheimer's disease</i> , \$36,000
1991-1993	American Health Assistance Foundation: <i>Determinants of cellular vulnerability in Alzheimer's disease</i> (Co-principal investigator with Dr J.H. Morrison), \$100,000
1991-1994	Brookdale National Fellowship Program (Medicine and Science): <i>Quantitative immunohistochemical analysis of neurodegenerative disorders in aging</i> , \$65,000
1995-1999	National Institutes of Health, NIA P50 AG005138 (Alzheimer's Disease Research Center): <i>Cellular and molecular correlates of vulnerability in Alzheimer's disease</i> (Co-principal investigator with Dr J.H. Morrison), \$125,000
1996-1997	Subcontract from George Washington University Medical Center: <i>Analysis of neuronal damage related to ischemic surgery</i> , \$6,500
1996-1998	American Health Assistance Foundation (National Glaucoma Research Award): <i>Selective neuronal damage in experimental glaucoma</i> , \$50,000
1996-1998	American Federation for Aging Research: <i>Retinal ganglion cell vulnerability in a non-human primate model of glaucoma</i> , \$50,000
1998-1999	National Institutes of Health, NIA P50 AG005138 (Alzheimer's Disease Research Center) Pilot Project: <i>Age-related changes in cortical neurons in very old macaque monkeys</i> , \$25,000
1998-1999	The Brookdale Foundation, Advancement in Leadership Program: <i>Age-related changes in glutamate receptor proteins in primate neocortex</i> , \$15,000
1998-1999	The Mount Sinai School of Medicine: <i>Age-related cortical alterations in great apes</i> , \$25,000
1998-1999	YBM Software Associates and Elsevier Science Publishers: <i>Development of virtual mouse brain atlases</i> , \$5,000
1999-2004	National Institutes of Health, NIA P50 AG005138 (Alzheimer's Disease Research Center) Project 2: <i>Quantitative indices of neocortical vulnerability in Alzheimer's disease</i> , \$124,000
1999-2004	National Institutes of Health, NIA P01 AG002219 (Clinical and Biological Studies of Early Alzheimer's Disease) Project 5: <i>Neurobiological indices of cognitive decline in aging</i> (Co-principal investigator with Dr J.H. Morrison), \$120,000
1999-2004	National Institutes of Health, NIMH P50 MH508911 (Conte Center for the Neuroscience of Mental Disorders): <i>Quantitative morphology core</i> , \$70,000

2000-2002	Howard Hughes Medical Institute/Mount Sinai School of Medicine Pilot Project Grant: <i>Mathematical analysis and modeling of dendritic branching and spine distribution as correlates of neural integration and age-related deficits in working memory</i> (Co-principal investigator with Dr S.L. Wearne), \$50,000
2000-2002	National Alzheimer's Coordinating Center: <i>Morphometric analyses of neuropathologic lesions in Alzheimer's disease</i> (Co-principal investigator with Dr D.P. Perl), \$90,000
2001	National Institutes of Health, NCRR S10 RR016754: <i>Acquisition of a SGI Onyx 3400 supercomputer for data visualization and mathematical modeling</i> (Co-principal investigator with Dr S.L. Wearne), \$500,000
2002-2004	Howard Hughes Medical Institute/Mount Sinai School of Medicine Pilot Project Grant: <i>Implementation of segmentation procedures for high field MR imaging in vivo and in vitro</i> (Co-principal investigator with Dr C.Y. Tang), \$50,000
2002-2004	National Institutes of Health, NIMH R21 MH067034: <i>Automated neuronal reconstruction from multiphoton images</i> (Co-principal investigator with Dr S.L. Wearne), \$169,500
2002-2006	National Institutes of Health, NIMH P50 MH066392 (Conte Center for the Neuroscience of Mental Disorders) Project 1: <i>An investigation of oligodendroglia in schizophrenia</i> , \$149,800
2004-2009	National Institutes of Health, NIMH P50 MH058911 (Conte Center for the Neuroscience of Mental Disorders): Quantitative morphology core , \$85,000
2004-2009	National Institutes of Health, NIA P01 AG002219 (Clinical and Biological Studies of Early Alzheimer's Disease) Project 1: <i>Quantitative analysis of microvascular changes in the aging brain</i> , \$144,000
2005-2008	The James S. McDonnell Foundation: <i>The neurobiology of social cognition and its disorders</i> (Co-principal investigator with Dr J.M. Allman), Research Project 22002078, Mount Sinai component, \$119,000
2005-2010	National Institutes of Health, NIA P50 AG005138 (Alzheimer's Disease Research Center) Project 1: <i>Selective neuronal vulnerability in the development of dementia</i> , \$138,000
2005-2010	National Institutes of Health, NIMH R01 MH071818: <i>Development of automated 3D software for dendrite and spine analysis</i> , \$292,000 (Principal investigator 2009-2010)
2007-2012	National Institutes of Health, NIMH P50 MH066392 (Conte Center for the Neuroscience of Mental Disorders) Project 1: <i>Oligodendrocyte and neuron pathology in cingulate cortex</i> , \$152,000
2008-2011	The Simons Foundation: <i>The role of SHANK3 in autism spectrum disorders</i> (Co-principal investigator with Dr J.D. Buxbaum), Project 2, \$75,000
2009-2011	Autism Speaks: <i>Neuropathologic correlates of alterations in higher cognitive functions in autism: analysis of cortical regions in the framework of the Autism Brain Atlas Project and the Autism Cellloidin Library</i> , Project ACL 2009, \$125,000
2009	National Institutes of Health, NCRR S10 RR025041: <i>Acquisition of a 7 T Bruker MR scanner for brain microimaging</i> (Co-principal investigator with Dr C.Y. Tang), \$2,000,000
2009-2013	The James S. McDonnell Foundation: <i>The neurobiology of social cognition: evolutionary anatomy and genomics</i> (Co-principal investigator with Dr J.M. Allman), Research Project 22002078, Mount Sinai component, \$125,000
2010-2011	Mount Sinai School of Medicine: <i>Modeling cellular determinants of cognitive decline in aging</i> , \$110,000
2010-2013	Australian Research Council: <i>New mathematics of fractional diffusion for understanding cognitive impairment at the neuronal level</i> (Co-principal investigator with Dr B.I. Henry, University of New South Wales, Sydney,

2010-2015	Australia), Project DP1094680, AUS\$100,000 National Institutes of Health, NIA P50 AG005138 (Alzheimer's Disease Research Center) Project 1: Alcadein processing and broad endophenotype of γ-secretase dysfunction (Co-project leader with Drs S. Gandy and D.L. Dickstein; Associate Director with Drs S. Gandy and M. Sano), \$138,000
2010-2015	National Institutes of Health, NIA R01 AG035071: Modeling cellular determinants of cognitive decline in aging , \$300,000 (Principal Investigator)
2011-2016	National Institutes of Health, NIMH R01 MH093725: SHANK3 role in autism spectrum disorders , \$300,000 (Co-principal investigator with Drs J.D. Buxbaum and J. Crawley)
2012-2015	National Institutes of Health, NIMH R44 MH093011: Automated 3D quantitative analysis of dendritic spines imaged with light microscopy , Mount Sinai component, \$150,000 (Phase I), \$185,000 (Phase II)
2014-2019	The Simons Foundation and Autism Speaks: Autism BrainNet, a new brain-banking network to promote autism research (Principal investigator and Director, Mount Sinai node) \$300,000
2014-2019	National Institutes of Health, NIMH R01 MH101584: Prefrontal function in the Shank-3-deficient rat: a first rat model for ASD , \$338,000 (Co-principal investigator with Dr J.D. Buxbaum)
Pending	National Institutes of Health, NIA P50 AG005138: (Alzheimer's Disease Research Center), Competitive renewal , (Associate Director with Drs S. Gandy and M. Sano) \$1,500,000
Pending	National Institutes of Health, NIA T32 AG049688: Research training in the neuroscience of aging , \$185,000 (Co-principal investigator with Dr M.G. Baxter)
In revision	National Institutes of Health, NINDS R01 NS083879: Development of probabilistic multi-field MRI-based mouse and rat brain atlases , \$110,000 (Mount Sinai component (Co-principal investigator with Drs S.J. Blackband and H. Benveniste)
In revision	National Institutes of Health, NINDS R01 NS086801: A low-energy brain blast rat model: functional relevance for PTSD , \$250,000 (Principal investigator)
In revision	National Institutes of Health, NIA P01 AG048819 (Mechanistic investigation of polyphenol bioactivities in Alzheimer's disease) Project 1: Preservation of synaptic plasticity and neuronal integrity in models of AD , \$208,600 (Co-project leader with Dr G.M. Pasinetti)
In revision	National Institutes of Health, NIA R01 AG049691: Preventing Alzheimer's pathology and memory loss in a preclinical mouse model , \$250,000 (Co-principal investigator with Dr P. Shaw)
In revision	National Institutes of Health, NIA R01 AG049710: Neural substrates of cognitive decline and curcumin intervention in aging monkeys , \$450,000 (Co-principal investigator with Dr J.I. Luebke)
Submitted	National Institutes of Health, NIA R01 AG051035: Comprehensive molecular characterization of neocortical pyramidal neurons; implications for selective cellular vulnerability in Alzheimer's disease , \$450,000 (Co-principal investigator with Dr D. Meyer)
Planned	National Institutes of Health, NIA/NINDS P01: Molecular and MultiOmyx signature of neurodegenerative disorders , \$250,000 (Project leader, Project 1)
Planned	National Institutes of Health, NIMH R01: Cortical gradients and age-related changes in neuron numbers and size in autism , (Co-principal investigator with Dr E. Courchesne)

CONSULTING

1997-1998	Neuroanatomy consultant on the development of a computer-assisted quantitative microscopy tool for biological structure analysis and interactive databasing, YBM Software Associates Inc., San Diego, CA
1997-2000	Comparative neuroanatomy consultant on a comparative biology of aging resource, Bioqual Inc., Rockville, MD
1998	Development of an interactive atlas of the mouse brain, Elsevier Science Publishers, Amsterdam, The Netherlands
1998-2000	Neuroanatomy consultant on a multimedia neuroscience methodology resource, Biosis Inc., Philadelphia, PA
1998-present	Member of the Board of Directors, Cingulum Neurosciences Institute Inc., Syracuse, NY
1999-present	Chairman of the Scientific Advisory Board and Member of the Board of Directors of the Foundation for Conservation and Comparative Biology, Needmore, PA
2001-2004	Comparative neuroanatomy consultant on a primate molecular genetics resource, Bioqual Inc., Rockville, MD
2001-2012	Member of the External Advisory Committee, NIH P01 AG00001 (Principal investigator, Dr D.L. Rosene), Boston University, Boston, MA
2001-2006	Neuroanatomy and microscopy consultant, Neurome Inc., San Diego, CA
2002-2006	Member of the Scientific Advisory Board, Sciencentral-NSF Public Understanding of Research (PUR) Project, New York, NY
2003-present	Member of the Advisory Board, Human Brain Project, University of Southern California, Los Angeles, CA
2005-2007	Member of the Program Advisory Committee of Howard University Specialized Neuroscience Research Program, Howard University, Washington, DC
2006-2012	Member of the External Advisory Board of the Brain Architecture Project, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY
2006-2007	Member of the Division of Anthropology Visiting Committee, American Museum of Natural History, New York, NY
2007	Consultant, The Stanley Medical Research Institute, Bethesda, MD
2007-present	Neuroanatomy Consultant, the Allen Institute for Brain Science, Seattle, WA
2007-2013	Chair of the Advisory Board, Human Brain Mapping Project, the Allen Institute for Brain Science, Seattle, WA
2008	Consultant, The Alzheimer's Study Group, Washington, DC
2008-2011	Consultant, LabSuite BrainNavigator Project, Elsevier Science Publishers, Amsterdam, The Netherlands
2008-2012	Consultant, The Yerkes National Primate Research Center, Atlanta, GA
2009-present	Member, Tissue Advisory Board, Autism Speaks, San Diego, CA
2011-present	Editor-in-Chief, The Journal of Comparative Neurology, Wiley-Liss Publishers, Hoboken, NJ
2012-present	Consultant, MBF Bioscience, Williston, VT
2012	Consultant, Paul, Weiss, Rifkind, Wharton & Garrison LLP, Washington, DC
2013-2014	Consultant, Down Syndrome Biobank, DownSyndrome Achieves, Columbus, OH
2013-present	Interim Chair (2013-2014) and Member of the Advisory Board, Human Cell Types Project, the Allen Institute for Brain Science, Seattle, WA
2014-present	Consultant, General Electrics Global Research, Niskayuna, NY

SOCIETIES

Society for Neuroscience (USA)
 Association for Research in Vision and Ophthalmology (USA)
 American Association of Neuropathologists (USA)
 American Association of Anatomists (USA)
 American Association of Physical Anthropologists (USA)
 American Society of Primatologists (USA)
 New York Consortium in Evolutionary Primatology (USA)
 New York Academy of Sciences (USA)
 Society for the Study of Mammalian Evolution (USA)
 J.B. Johnston Club (USA)
 Cajal Club (USA)
 Dana Alliance for Brain Initiatives (USA)
 Sigma Xi (USA)
 American Association of French Speaking Health Professionals (USA)
 Western Pacific Neurological Society (Guam, Mariana Islands)
 International Society for Autism Research
 International Brain Research Organization
 International Society of Neuropathology
 International Primatological Society
 International Society for Stereology

PEER-REVIEW ACTIVITIES

- Reviewer for the National Institutes of Health (former Member, Developmental Brain Disorders ZRG1 DBD, Molecular Biology ZRG1 MDCN-L, Brain Disorders and Clinical Neurosciences ZRG1 BDCN-F01; *ad hoc* member Beeson Career Development Awards ZAG1 ZIJ-9, and Loan Repayment Program ZAG1 ZIJ-2, Conflict ZRG1 BDCN-N, Challenge Grant ZRG1 BDCN-T58 Study Sections, and *ad hoc* reviewer, Mental Health and Neurodegenerative Disorders, Molecular Biology and Molecular Neuropharmacology, Director's New Innovator Award Program, and Signaling Study Sections), the National Science Foundation (Sensory Systems, Physical Anthropology, and Instruments and Instrumentation Development Sections), the National Research Council (National Academy of the Sciences of the USA), the Human Frontier Science Program, the Brookdale Foundation, the Larry L. Hillblom Foundation, the Sandoz Foundation for Gerontological Research, the Research into Ageing Programme, the American Federation for Aging Research (Member, National Scientific Advisory Council), the Alzheimer's Association, the Swiss National Scientific Research Foundation, the National Research Foundation of the Republic of South Africa, the City University of New York (Intramural Programs), Vanderbilt University (Diabetes Research Program), Katholieke Universiteit Leuven (Intramural Programs), the Fonds de la Recherche sur la Nature et les Technologies du Québec, and the University of Witwatersrand (Intramural Programs)
- Editor-in-Chief, The Journal of Comparative Neurology (2011-); Interdisciplinary Topics in Gerontology (1999-2010)
- Member of the editorial boards of Brain Structure and Function (Section Editor, Neuroanatomy of Brain Dysfunction, 2007-), Neurobiology of Aging (2001-; Reviewing Editor, Structure, 2014-), Frontiers in Neuroscience (Associate Editor, Frontiers in Neuroanatomy, 2007-; Member, Frontiers in Aging Neuroscience, 2013-), Molecular Autism (2009-; Associate Editor, 2012-), Translational Neuroscience (Senior Advisory Editor, 2009-); Acta Neuropathologica (2006-), Acta Neuropathologica Communications (2013-), Anatomical Record (2010-), Experimental Neurology (2001-), Journal of Chemical Neuroanatomy (2001-; Associate Editor, 2003-2008), Journal of Comparative Neurology (2002-), Neuroscience (2003-); Brain Research

(Senior Editor, Structural Organization of the Brain Section, 2005-2010), Brain Research Reviews (Senior Editor, 2005-2010), Primates (2004-2008)

- Reviewer for the following journals and publishers: Acta Neuropathologica, Acta Neuropathologica Communications, Alzheimer's Disease and Associated Disorders, American Journal of Pathology, American Journal of Primatology, American Journal of Psychiatry, Annals of the New York Academy of Sciences, Anatomy and Embryology, Anatomical Record, Annals of Neurology, Archives of General Psychiatry, Behavioral and Brain Sciences, Biological Psychiatry, BMC Neuroscience, Brain, Brain Behavior and Evolution, Brain Pathology, Brain Research, Brain Research Bulletin, Brain Research Interactive, Brain Research Protocols, Brain Research Reviews, Brain Structure and Function, British Journal of Pharmacology, Cell and Tissue Research, Cell Transplantation, Cerebral Cortex, Developmental Brain Research, Discussions in Neuroscience, European Journal of Neuroscience, Experimental Gerontology, Experimental Neurology, Frontiers in Aging Neuroscience, Frontiers in Neuroanatomy, Hippocampus, Histochemical Journal, Investigative Ophthalmology and Visual Sciences, Journal of Anatomy, Journal of Autism and Developmental Disorders, Journal of Chemical Neuroanatomy, Journal of Cognitive Neuroscience, Journal of Comparative Neurology, Journal of Gerontology, Journal of Histochemistry and Cytochemistry, Journal of Morphology, Journal of Neurobiology, Journal of Neurology, Journal of Neuropathology and Experimental Neurology, Journal of Neuroscience, Journal of Neuroscience Methods, Journal of Neuroscience Research, Molecular Autism, Molecular Psychiatry, Molecular Vision, Nature Neuroscience, Neurobiology of Aging, Neurobiology of Disease, Neurochemical Research, NeuroImage, NeuroMolecular Medicine, Neuron, Neuropathology and Applied Neurobiology, Neuropsychologia, Neuropsychopharmacology, Neuroscience, Neuroscience and Biobehavioral Reviews, Neuroscience Letters, Optometry and Vision Science, PLoS Biology, Primates, Proceedings of the National Academy of Sciences of the USA, Psychiatry Research, Schizophrenia Research and Treatment, Translational Neuroscience, Science, The New Anatomist, The New England Journal of Medicine, Vision Research, Visual Neuroscience; Academic Press, Cambridge University Press, Elsevier Science Publishers, Johns Hopkins University Press, Oxford University Press, Wiley-Blackwell Publishing

TEACHING AND MENTORING

1982-1987	Teaching Assistant, Gross Anatomy, Histology, and Neuroanatomy courses, Department of Morphology, University of Geneva, Switzerland
1986-1987	Lecturer, Pharmacology for dentistry students, Department of Pharmacology, University of Geneva, Switzerland
1990-2012	Faculty, Brain and Behavior, Neurobiological Methods (1990-1993), Neurobiology of Aging, Molecular Bases of Disease, Neurodevelopment, and Principles of Neurobiology courses; Mount Sinai School of Medicine, New York
1992-1993	Faculty, Neurobiology course, City University of New York Graduate Center, New York
1992-2003	Faculty, Neurosciences course, Sophie Davis School of Biomedical Education, City College of the City University of New York, New York
1998-2006	Course Director, Advanced Neuroanatomy course, Graduate School of Biomedical Sciences at Mount Sinai, New York, USA
1999	Lecturer, Salk School of Science, New York
2000-2012	Course Co-Director, Systems Neuroscience (Neuroscience Core I) course, Graduate School of Biomedical Sciences at Mount Sinai, New York, USA
2001	Co-organizer and Faculty, Neurostereology course, University of Aachen, Germany
2005	Faculty, Neurostereology course, Maastricht University, The Netherlands

2007-present	Director, Friedman Brain Institute Translational Neuroscience Seminar Series, Icahn School of Medicine at Mount Sinai, New York
2010	Co-Organizer, Brain Research conference <i>The Emerging Neuroscience of Autism Spectrum Disorders: Etiologic Insights, Treatment Opportunities</i> , San Diego
2011	Faculty, Allen Institute for Brain Science Molecular Neuroanatomy Workshop, Okinawa Institute of Science and Technology, Okinawa, Japan
2011-present	Vice-Chair for Mentoring, Fishberg Department of Neuroscience, Icahn School of Medicine at Mount Sinai, New York
2013-present	Director, Physician Scholars Program, Graduate School of Biomedical Sciences at Mount Sinai, New York, USA
2014-present	Course Co-Director, Evolutionary Neuroscience course, Graduate School of Biomedical Sciences at Mount Sinai, New York, USA
1990-present	<p>Member of the PhD thesis examination committees of Stephen D. Ginsberg (1993), Steven J. Siegel (1994), Esther A. Nimchinsky (1995), David A. Jaeger (1997), Angela Ho (1998), Geo Serban (2000), Cynthia A. Sailstad (2002), Sara F. Farrell (2003), I-Wei Shu (2004), Christina M. Copland (2005), Tara Lauriat (2007), Jul-Lea Shamy (2007), C. Sehwan Park (2007), Elizabeth Kichula (2008), Erin Rich (2008), Devorah Segal (2008), Deena Goldwater (2008), Yuji Kajiwara (2008), Afia Akram (2010), Patrick Coskren (2011), Xiaosi Gu (2011), Erik Bloss (2011), John Steele IV (2011), Danae Papapetrou (2013), Megan Bailey (2013), Rhonda Charles (2013), Sarah Crowe (2013), Angila Sewal (2013), Neha Uppal (2013), Hannah Brautigam (2013), Noël Warren (2014), Tuyen Nguyen (2012-), and Cheng Jiang (2013-), Icahn School of Medicine at Mount Sinai, New York</p> <p>Member of the student advisory committees of Esther A. Nimchinsky (1991-1995), Adam H. Gazzaley (1992-1994), Brett M. Morrison (1993-1998), Bindya Moorjani (1994-1998), Cynthia A. Sailstad (1996-2002), Huiling Duan (1997-2003), Sara F. Farrell (2000-2003), Tara Lauriat (2001-2007), Joseph R. Ashour (2002-2003), C. Sehwan Park (2002-2007), Doron Kabaso (2002-2007), Elizabeth Watson (2003-2005), Patrick Coskren (2003-2011), Afia Akram (2003-2010), Tony Flores (2004-2005), Jul-Lea Shamy (2004-2007), Elizabeth Kichula (2004-2008), Yuji Kajiwara (2004-2008), Devorah Segal (2004-2008), Erin Rich (2005-2008), Deena Goldwater (2005-2008), Jason Schneiderman (2005-2008), David Carpenter (2005-2008), Ilana Seror (2006-2009), Dani Dumitriu (2006-2010), Minhua Zhang (2007-2009), Steven D. Stockton Jr. (2008-2010), James Reilly (2007-2011), Ittai Bushlin (2008-2010), Jessica Nikitczuk (2008-2011), Megan Bailey (2008-2013), Xiaosi Gu (2009-2011), Erik Bloss (2009-2011), John Steele IV (2009-2011), Danae Papapetrou (2009-2013), Rhonda Charles (2009-2013), Neha Uppal (2009-2013), Hannah Brautigam (2009-2013), Sarah Crowe (2010-2013), Noël Warren (2010-2014), Tuyen Nguyen (2010-), Bridget Marcellino (2011-2012), and Cheng Jiang (2013-), Icahn School of Medicine at Mount Sinai, New York</p>
1991-1995	Co-Advisor (with Dr J.H. Morrison) of the PhD thesis project of Esther A. Nimchinsky, Mount Sinai School of Medicine, New York
1996-1998	Advisor of the MA thesis project of Kristen R. Fisher, City University of New York, New York
1997-2003	Advisor of the PhD thesis project of Huiling Duan, Mount Sinai School of Medicine, New York
1999	Advisor of the MS thesis project of Nazlie Sadeghi, New York University, New York

2003-2010	Co-Advisor (with Dr V. Haroutunian) of the PhD thesis project of Afia Akram, Mount Sinai School of Medicine, New York
2004-2008	Advisor of the PhD thesis project of Devorah Segal, Mount Sinai School of Medicine, New York
2005-2008	Mentor of the NRSA Fellowship of Devorah Segal (NIH grant F31 MH082286)
2008-2010	Advisor of the MS thesis project of Jessica J. Walsh, Mount Sinai School of Medicine, New York
2009-2010	Advisor of the MS thesis project of Yuan Gao, Mount Sinai School of Medicine, New York
2009-2010	Advisor of the MS thesis project of Neha Uppal, Mount Sinai School of Medicine, New York
2009-2011	Co-Advisor (with Dr J. Fan) of the PhD thesis project of Xiaosi Gu, Mount Sinai School of Medicine, New York
2009-2011	Advisor of the PhD thesis project of Patrick C. Coskren, Mount Sinai School of Medicine, New York
2009-2013	Co-Advisor (with Dr J.D. Buxbaum) of the PhD thesis project of Danae Papapetrou, Icahn School of Medicine at Mount Sinai, New York
2009-2013	Co-Advisor (with Dr S. Gandy) of the PhD thesis project of Hannah Brautigam, Icahn School of Medicine at Mount Sinai, New York
2010-2013	Co-Advisor (with Dr J.D. Buxbaum) of the PhD thesis project of Neha Uppal, Icahn School of Medicine at Mount Sinai, New York
2010-2012	Co-Advisor (with Dr D.L. Dickstein) of the MS thesis project of Sawitree Fon Kangmuang, Mount Sinai School of Medicine, New York
2011-2014	Co-Mentor (with Dr S. Gandy) of the NRSA Fellowship of Hannah Brautigam (NIH grant F31 AG039890), Icahn School of Medicine at Mount Sinai, New York
2013-2015	Advisor of the MS thesis project of Angelique Petropouleas, Icahn School of Medicine at Mount Sinai, New York
2012-	Co-Advisor (with Dr J. Fan) of the PhD thesis project of Tuyen Nguyen, Icahn School of Medicine at Mount Sinai, New York
1990-1992	Executive member (rapporteur) of Luc Buée PhD thesis committee, Université des Sciences et Technologies de Lille, France
1999-2000	Member of the PhD thesis examination committee of Vincent Mittoux, Université Paris XII, France
2000-2003	Member of the PhD thesis examination committee and co-mentor (with Dr R. Holloway) of Chester C. Sherwood, Department of Anthropology, Columbia University, New York
2003-2008	Member of the PhD thesis examination committee of Alexandra A. de Souza, Department of Anthropology, George Washington University, Washington, DC
2003-2005	Member of the PhD thesis examination committee of Bart P.F. Rutten, Department of Psychiatry and Neuropsychology, Maastricht University, The Netherlands
2005-2008	Member of the PhD thesis examination committee of Pawel Kreczmanski, Department of Psychiatry and Neuropsychology, Maastricht University, The Netherlands
2006-2007	Examiner of the PhD thesis of Muhammad Spoter, Faculty of Sciences, University of the Witwatersrand, South Africa
2006-2007	Member of the PhD thesis examination committee of Sandy Jacobs, Department of Biology, Katholieke Universiteit Leuven, Belgium
2006-2009	Member of the PhD thesis examination committee and co-mentor (with Dr B. Cozzi) of Camilla Butti, Department of Experimental Veterinary Science, University of Padova, Italy

2010-2014	Member of the PhD thesis examination committee of Amy L. Bauernfeind, Department of Anthropology, George Washington University, Washington, DC
2012-2014	Member of the PhD thesis examination committee of Marissa J. Schafer, Department of Basic Medical Science, New York University, New York, NY
1999-2001	Mentor of the postdoctoral fellowship of Thierry Bussière, PhD, Mount Sinai School of Medicine, New York
2002-2006	Mentor of the postdoctoral fellowship of Anne B. Rocher, PhD, Mount Sinai School of Medicine, New York
2003-2004	Mentor of the postdoctoral fellowship of Claire-Bénédicte Rivara, MD, Mount Sinai School of Medicine, New York
2003-2004	Supervisor of the visiting fellowship of Armin von Gunten, MD, Mount Sinai School of Medicine, New York, and University of Lausanne, Switzerland
2005-2007	Supervisor of the visiting fellowship of Estelle Van der Gucht, PhD, Mount Sinai School of Medicine, New York, and Katholieke Universiteit Leuven, Belgium
2005-2007	Mentor of the postdoctoral fellowship of Dara L. Dickstein, PhD, Mount Sinai School of Medicine, New York
2008-2010	Mentor of the postdoctoral fellowship of A. Malin Höistad, PhD, Mount Sinai School of Medicine, New York
2009-2011	Mentor of the postdoctoral fellowship of Micaela Santos, MD, Mount Sinai School of Medicine, New York
2009-2011	Mentor of the postdoctoral fellowship of Camilla Butti, PhD, Mount Sinai School of Medicine, New York
2009-2012	Mentor of the postdoctoral fellowship of Aniruddha Yadav, PhD, Mount Sinai School of Medicine, New York
2011	Supervisor of the research internship of Sarah Jacot-Descombes, MD, Mount Sinai School of Medicine, New York, and University of Geneva, Switzerland
2013-2014	Co-supervisor (with Dr D.L. Dickstein) of the visiting fellowship of Maciej Lazarczyk, MD, PhD, Icahn School of Medicine at Mount Sinai, New York, and University of Geneva, Switzerland
2013-	Mentor of the postdoctoral fellowship of Timothy Rumbell, PhD, Icahn School of Medicine at Mount Sinai, New York
2014-	Co-mentor (with Dr D.L. Dickstein) of the postdoctoral fellowship of Merina Varghese, PhD, Icahn School of Medicine at Mount Sinai, New York
1998	Mentor of the Sigma Xi Fellowship of Kathleen A. O'Donnell (BA student)
1999	Mentor of the Hartford/AFAR Fellowship of Tanya L. Page (MD student)
2000	Mentor of the Hartford/AFAR Fellowship of Michael Einstein (MD student)
2001	Mentor of the Hartford/AFAR Fellowship of Lara Marcuse (MD student)
2001	Mentor of the Hartford/AFAR Fellowship of Joshua Steinerman (MD student)
2001-2003	Mentor of the SURP Fellowships of Tony Flores (BS student)
2002	Mentor of the Samuels/Hartford/AFAR Fellowship of Aisha Macedo (MD student)
2003-2005	Mentor of the Doris Duke Clinical Research Fellowship and Bristol Myers Squibb Medical Research Fellowship of Thomasina Bailey (MS/MD student)
2003-2004	Mentor of the Siemens and Intel Projects of Abba and Shoshana Leffler (Bronx High School of Science undergraduate students)
2004	Mentor of the Hartford/AFAR Fellowship of Melissa Kujawski (MD student)
2005-2006	Mentor of the Intel Project of Rebecca Chanis (Bronx High School of Science undergraduate student)
2007	Mentor of the SURP Fellowship of Hannah Brautigam (BS student)
2008	Mentor of the SURP Fellowship of Zoe Evans (BS student)

2008-2009	Mentor of the Biomedical Sciences Exchange Program Fellowship of Alexander Kern (MD student, Johann Wolfgang Goethe University, Frankfurt, Germany)
2009-2010	Mentor of the Doris Duke Clinical Research Fellowship of Elizabeth Schwartz (MS/MD student)
2011-2012	Co-Mentor (with Dr D.L. Dickstein) of the MS internship of Julia Kemmler from the University of Konstanz, Germany
2012	Mentor of the SURP Fellowship of Mengxi Shi (BS student)
2014	Mentor of the research internship of Julian Knopf (MD student, Johann Wolfgang Goethe University, Frankfurt, Germany)

LECTURES AND SEMINARS

1985	Department of Pharmacology, University of Geneva, Switzerland
1987	Department of Pharmacology, University of Geneva, Switzerland
1989	Department of Pharmacology, University of Geneva, Switzerland Department of Psychiatry, University of Geneva, Switzerland Division of Preclinical Neuroscience and Endocrinology, Research Institute of Scripps Clinic, La Jolla, CA
	Institute of Anatomy, University of Lausanne, Switzerland
	Institute of Physiology, University of Fribourg, Switzerland
	Scripps Research Institute, La Jolla, CA
1990	Institute of Neurobiology Santiago Ramón y Cajal, Madrid, Spain Department of Psychiatry, Mount Sinai Hospital, New York, NY
	Institute of Histology, University of Fribourg, Switzerland
1991	Department of Pharmacology, University of Geneva, Switzerland Department of Psychiatry, University of Geneva, Switzerland Glaxo Institute for Molecular Biology, Geneva, Switzerland The Brookdale Foundation, New York, NY Department of Geriatrics, Mount Sinai Hospital, New York, NY
	Annual Workshop of the School of Pharmacy, University of Lausanne, Switzerland
1992	Swiss Society for Biological Psychiatry, Zürich, Switzerland Conference on Neurodegenerative Disorders in the Western Pacific Region, Guam Glaxo Institute for Molecular Biology, Geneva, Switzerland The Brookdale Foundation, New York, NY Fishberg Research Center for Neurobiology, Mount Sinai School of Medicine, New York, NY Institute of Histology and Society of Medicine, University of Fribourg, Switzerland Department of Physiology and Pharmacology, Bowman-Gray School of Medicine, Winston-Salem, NC
1993	Department of Geriatrics, Mount Sinai Hospital, New York, NY The Brookdale Foundation, New York, NY Institute of Histology, University of Fribourg, Switzerland
1994	The Brookdale Foundation, New York, NY Department of Geriatrics, Mount Sinai Hospital, New York, NY School of Journalism, Columbia University, New York, NY Third Lille Neuroscience Workshop, Lille, France
1995	Department of Neurology, Mount Sinai Hospital, New York, NY The Brookdale Foundation, New York, USA Human Brain Project Spring Conference, NIH, Bethesda, USA The Institute of Ophthalmology, London University, London, UK
1996	Department of Psychiatry, University of Geneva, Switzerland

	Human Brain Project Spring Conference, NIH, Bethesda, MD
	IPSEN Foundation, Paris, France
	INSERM U422, Lille, France
	Department of Neurology, Mount Sinai Hospital, New York, NY
	Institute of Cell Biology and Morphology, University of Lausanne, Switzerland
1997	FASEB Annual Meeting, New Orleans, LA
	Society of Neuroscientists of Africa Conference, Capetown, Republic of South Africa
	European Congress of the World Psychiatric Association, Geneva, Switzerland
	Department of Geriatrics, Mount Sinai Hospital, New York, NY
	Department of Geriatrics, University of Geneva, Switzerland
1998	Department of Physiology and Biophysics, State University of New York, Buffalo, NY
	Age-Related Neurobehavioral Research Workshop, NIH, Bethesda, MD
	14th Annual Alzheimer's Disease Symposium, Gatlinburg, TN
	American Society of Primatologists, Georgetown, MD
	Society for Neuroscience 1998 Short Course, Los Angeles, CA
	Conference on Age-Related Neurodegenerative Disorders in Micronesia, Guam
1999	Bioqual Inc., Rockville, MD
	Yerkes Primate Research Center, Atlanta, GA
	Mayo Clinic Jacksonville, Jacksonville, FL
	Vogt-Brodmann Symposium on Brain Mapping, Düsseldorf-Jülich, Germany
	American Society of Primatologists, New Orleans, LA
	J.B. Johnston Club and Karger Workshop on Brain Evolution, Miami Beach, FL
	Division of Experimental Diabetes and Aging, Mount Sinai School of Medicine, New York, NY
2000	Foundation for Conservation and Comparative Biology, Frostburg, MD
	Department of Anesthesiology, University of Maryland, Baltimore, MD
	Department of Neurology, Mount Sinai Hospital, New York, NY
	Département de Recherche Médicale, Service Hospitalier Frédéric Joliot, Orsay, France
	Department of Psychiatry, University of Geneva, Switzerland
	Department of Biology and Anatomical Sciences, City University of New York, New York, NY
	6th Annual Stereology Workshop, New Orleans, LA
	Courant Institute for Mathematics, New York University, New York, NY
	COE International Symposium on Primate Development and Aging, Kyoto University Primate Research Center, Inuyama, Japan
2001	18th Congress of the International Primatological Society, Adelaide, Australia
	9th IBC International Conference on Alzheimer's Disease, Atlanta, GA
	Sackler Institute for Developmental Psychobiology, Cornell University School of Medicine, and Rockefeller University, New York, NY
	8th Annual Meeting of the Cognitive Neuroscience Society, New York, NY
	Foundation for Conservation and Comparative Biology, Blacksburg, VA
	Department of Neurology, University of Aachen, Germany
	Cajal Club Meeting, Instituto Cajal, Madrid, Spain
	30th Annual Meeting of the American Aging Association, Madison, WI
	California Institute of Technology, Pasadena, CA
	Department of Anatomy and Neurobiology, Boston University, Boston, MA
2002	Brain Awareness Week Lecture, Department of Psychiatry and Behavioural Neurosciences, McMaster University, Hamilton, ON, Canada
	Department of Molecular Biology, Princeton University, Princeton, NJ
	Cajal Club Meeting, Presidential Symposium, New Orleans, LA
	LOH Conference on Origins of Humans, La Jolla, CA

- 2003 International Conference on Schizophrenia Research, Colorado Springs, CO
 Sanders-Brown Research Center on Aging, University of Kentucky, Lexington, KY
 Annual Meeting of the Federation of American Societies of Experimental Biology,
 San Diego, CA
 Translational Neuroscience Interdepartmental Seminar, Mount Sinai School of
 Medicine, New York, NY
 Committee of 1000, Mount Sinai School of Medicine, New York, NY
 Alzheimer's Association Zenith Award Meeting, Mount Sinai School of Medicine, New
 York, NY
- 2004 Department of Psychiatry, Mount Sinai School of Medicine, New York, NY
 Cold Spring Harbor Laboratory, Cold Spring Harbor, NY
 Brookhaven National Laboratory, Upton, NY
- 2005 Yerkes National Primate Research Center, Emory University, Atlanta, GA
 Center for Brain Health, New York University, New York, NY
 Annual Meeting of the Federation of American Societies of Experimental Biology,
 San Diego, CA
 EURON Neurostereology Meeting and Training Course, Maastricht, The Netherlands
 Annual Meeting of the Society of Biological Psychiatry, Atlanta, GA
- 2006 5th Dutch Endo-Neuro-Psycho Meeting, Doorwerth, The Netherlands
 California Institute of Technology, Pasadena, CA
 Sackler Colloquia of the National Academy of Sciences, Beckman Center, Irvine, CA
- 2007 31st Winter Conference on the Neurobiology of Learning and Memory, Park City, UT
 Allen Institute for Brain Science, Seattle, WA
 Center for Molecular and Behavioral Neuroscience, Rutgers University, Newark, NJ
 Barrow Neurological Institute, Phoenix, AZ
 Department of Experimental Veterinary Medicine, University of Padova, Italy
 James S. McDonnell Foundation Network Meeting, San Francisco, CA
 The Stanley Medical Research Institute, Bethesda, MD
- 2008 32nd Winter Conference on the Neurobiology of Learning and Memory, Park City, UT
 The American Museum of Natural History, James Arthur Lecture on Human Brain
 Evolution, New York, NY
 Department of Neurobiology, Yale University, New Haven, CT
 New York State Institute for Brain Research, Staten Island, NY
- 2009 Advances in Autism Conference, Mount Sinai School of Medicine, New York, NY
 Therapeutics for Cognitive Aging Symposium, New York Academy of Sciences, New
 York, NY
 32nd Annual Meeting of the American Society of Primatologists, San Diego, CA
- 2010 Department of Neuroscience, Mount Sinai School of Medicine, New York, NY
 Amicus Neuroscience, La Jolla, CA
 Department of Surgery Grand Rounds, Mount Sinai School of Medicine, New York, NY
 Department of Psychiatry, Mount Sinai School of Medicine, New York, NY
 Nathan Kline Institute, New York University, Orangeburg, NY
 Brain Aging Training Program, University of California San Diego, La Jolla, CA
 World Science Festival, New York, NY
 Welker Memorial Symposium on Neurobehavioral Evolution, National Museum of
 Health and Medicine, Washington, DC
 Scientific Computing and Imaging Institute, University of Utah, Salt Lake City, UT
 Seattle Children's Research Institute, Seattle, WA
 Brain Research Meeting on the Emerging Neuroscience of Autism Spectrum Disorders,
 San Diego, CA
 Department of Anatomy, Ludwig-Maximilians-University, Munich, Germany
 Children's Environmental Health Center, Mount Sinai Medical Center, New York, NY

- 2011 New York State Autism Consortium Meeting, IBR, Staten Island, NY
 Department of Physiology and Neurobiology, Dartmouth University, Dartmouth, NH
 Department of Psychiatry, Mount Sinai School of Medicine, New York, NY
 Cold Spring Harbor Laboratory, Cold Spring Harbor, NY
 Okinawa Institute of Science and Technology, Okinawa, Japan
 International Conference on Familial Dysautonomia, New York, NY
- 2012 Department of Neuroscience, Mount Sinai School of Medicine, New York, NY
 Campaign for Mount Sinai, West Palm Beach, FL
 American Association of French Speaking Health Professionals, New York, NY
 Alzheimer's Disease and Neurodegenerative Disorders Group, Mount Sinai School of Medicine, New York, NY
- 2013 Department of Mental Health and Psychiatry, University of Geneva School of Medicine, Geneva, Switzerland
 32nd Annual Meeting of the J.B. Johnston Club, San Diego, CA
 DownSyndromeAchieves Foundation, Columbus, OH
 Symposium Constantin Bouras, University of Geneva, Geneva, Switzerland
- 2014 International Meeting for Autism Research, Atlanta, GA
 General Electric Global Research Center, Niskayuna, NY
 HealthyImagination Media Track, General Electric Global Research Center, Niskayuna, NY
 Summit on Human Evolution, The Paul G. Allen Family Foundation, Seattle, WA

MEETINGS AND CONFERENCES

- 1985 3rd Symposium on VIP and related peptides, Cap d'Agde, France
 17th Annual Meeting of the Union of the Swiss Societies for Experimental Biology, Geneva, Switzerland
- 1986 18th Annual Meeting of the Union of the Swiss Societies for Experimental Biology, Basel, Switzerland
 4th Study Group of the Foundation for the Study of the Nervous System, Geneva, Switzerland
 16th Annual Meeting of the Society for Neuroscience, Washington, DC
- 1987 19th Annual Meeting of the Union of the Swiss Societies for Experimental Biology, Lausanne, Switzerland
 5th Study Group of the Foundation for the Study of the Nervous System, Geneva, Switzerland
 2nd World Congress of Neuroscience, Budapest, Hungary
 17th Annual Meeting of the Society for Neuroscience, New Orleans, LA
- 1988 6th Study Group of the Foundation for the Study of the Nervous System, Geneva, Switzerland
 18th Annual Meeting of the Society for Neuroscience, Toronto, Canada
- 1989 Annual meeting of the Swiss Society for Biological Psychiatry, Geneva, Switzerland
 7th Study Group of the Foundation for the Study of the Nervous System, Geneva, Switzerland
 114th Annual Meeting of the American Neurological Association, New Orleans, LA
- 1990 19th Annual Meeting of the Society for Neuroscience, Phoenix, AZ
 1st Annual Neurocircuitry Database Workshop, La Jolla, CA
 20th Annual Meeting of the Society for Neuroscience, St Louis, MO
- 1991 The Brookdale Foundation Annual Retreat, Garden City, NY
 67th Annual Meeting of the American Association of Neuropathologists, Baltimore, MD
- 1992 21st Annual Meeting of the Society for Neuroscience, New Orleans, LA
 Conference on Neurodegenerative Disorders in the Western Pacific Region, Agaña, Guam

The Brookdale Foundation Annual Retreat, Garden City, NY
 68th Annual Meeting of the American Association of Neuropathologists, St Louis, MO
 22nd Annual Meeting of the Society for Neuroscience, Anaheim, CA
 1993 The Brookdale Foundation Annual Retreat, Garden City, NY
 23rd Annual Meeting of the Society for Neuroscience, Washington, DC
 1994 The Brookdale Foundation Annual Retreat, Garden City, NY
 Annual Meeting of the Association for Research in Vision and Ophthalmology, Sarasota, FL
 3rd Lille Neuroscience Workshop, Lille, France
 24th Annual Meeting of the Society for Neuroscience, Miami Beach, FL
 1995 The Brookdale Foundation Annual Retreat, Garden City, NY
 15th Washington International Spring Symposium, Washington, DC
 Annual Meeting of the Association for Research in Vision and Ophthalmology, Fort Lauderdale, FL
 2nd Annual Spring Meeting of the Human Brain Project, NIH, Bethesda, MD
 25th Annual Meeting of the Society for Neuroscience, San Diego, CA
 1996 The Brookdale Foundation Annual Retreat, Teaneck, NJ
 3rd Annual Spring Meeting of the Human Brain Project, NIH, Bethesda, MD
 12th Colloque Médecine et Recherche, Fondation IPSEN, Paris, France
 26th Annual Meeting of the Society for Neuroscience, Washington, DC
 1997 Annual Meeting of the Federation of American Societies of Experimental Biology, New Orleans, LA
 The Brookdale Foundation Annual Retreat, Teaneck, NJ
 3rd International Conference of the Society of Neuroscientists of Africa, Capetown South Africa
 European Congress of the World Psychiatric Association, Geneva, Switzerland
 4th Annual Spring Meeting of the Human Brain Project, NIH, Bethesda, MD
 27th Annual Meeting of the Society for Neuroscience, New Orleans, LA
 1998 Annual Meeting of the Federation of American Societies of Experimental Biology, San Francisco, CA
 The Brookdale Foundation Annual Retreat, Teaneck, NJ
 5th Annual Spring Meeting of the Human Brain Project, NIH, Bethesda, MD
 Age-Related Neurobehavioral Research Workshop, NIH, Bethesda, MD
 14th Annual Alzheimer's Disease Symposium, University of Tennessee, Gatlinburg, TN
 21st Annual Meeting of the American Society of Primatologists, Georgetown, MD
 28th Annual Meeting of the Society for Neuroscience, Los Angeles, CA
 Conference on Age-Related Neurodegenerative Disorders in Micronesia, Guam
 1999 Annual Meeting of the American Foundation for Aging Research, Santa Barbara, CA
 Vogt-Brodmann Symposium on Brain Mapping, Düsseldorf-Jülich, Germany
 22nd Annual Meeting of the American Society of Primatologists, New Orleans, LA
 The Brookdale Foundation Annual Retreat, Glen Cove, NY
 19th Annual Meeting of the J.B. Johnston Club, Miami Beach, FL
 11th Karger Workshop on Brain Evolution, Miami Beach, FL
 29th Annual Meeting of the Society for Neuroscience, Miami Beach, FL
 2000 Meeting of the Foundation for Conservation and Comparative Biology, Frostburg, MD
 The Brookdale Foundation Annual Retreat, New York, NY
 23rd Annual Meeting of the American Society of Primatologists, Boulder, CO
 6th Annual Stereology Workshop, New Orleans, LA
 30th Annual Meeting of the Society for Neuroscience, New Orleans, LA
 COE International Symposium on Primate Development and Aging, Inuyama, Japan
 2001 18th Congress of the International Primatological Society, Adelaide, Australia
 9th IBC International Conference on Alzheimer's Disease, Atlanta, GA

	8th Annual Meeting of the Cognitive Neuroscience Society, New York, NY
	Foundation for Conservation and Comparative Biology, Blacksburg, NY
	1st German-US Neurostereology Meeting and Training Course, Aachen, Germany
	Cajal Club Meeting, Instituto Cajal, Madrid, Spain
	30th Annual Meeting of the American Aging Association, Madison, WI
	24th Annual Meeting of the American Society of Primatologists, Savannah, GA
	The Brookdale Foundation Annual Retreat, Mahwah, NJ
	31st Annual Meeting of the Society for Neuroscience, San Diego, CA
2002	Annual Meeting of the Federation of American Societies of Experimental Biology, New Orleans, LA
	The Brookdale Foundation Annual Retreat, New York, NY
	25th Annual Meeting of the American Society of Primatologists, Oklahoma City, OK
	32nd Annual Meeting of the Society for Neuroscience, Orlando, FL
	LOH Conference on Origins of Humans, La Jolla, CA
2003	International Conference on Schizophrenia Research, Colorado Springs, CO
	Annual Meeting of the Federation of American Societies of Experimental Biology, San Diego, CA
	The Brookdale Foundation Annual Retreat, New York, NY
	33rd Annual Meeting of the Society for Neuroscience, New Orleans, LA
2004	Annual Meeting of the Society of Biological Psychiatry, New York, NY
	34th Annual Meeting of the Society for Neuroscience, San Diego, CA
	Cold Spring Harbor Laboratory Meeting on Brain Architecture, Cold Spring Harbor, NY
2005	Annual Meeting of the Federation of American Societies of Experimental Biology, San Diego, CA
	James S. McDonnell Foundation Network Meeting, Washington, DC
	EURON Neurostereology Meeting and Training Course, Maastricht, The Netherlands
	Annual Meeting of the Society of Biological Psychiatry, Atlanta, GA
	35th Annual Meeting of the Society for Neuroscience, Washington, DC
2006	James S. McDonnell Foundation Network Meeting, Pasadena, CA
	5th Dutch Endo-Neuro-Psycho Meeting, Doorwerth, The Netherlands
	36th Annual Meeting of the Society for Neuroscience, Atlanta, GA
	Sackler Colloquia of the National Academy of Sciences, Beckman Center, Irvine, CA
2007	31st Winter Conference on the Neurobiology of Learning and Memory, Park City, UT
	James S. McDonnell Foundation Network Meetings, Washington, DC; San Francisco, CA
	Alzheimer's Disease Center Directors Meeting, Boston, MA
	37th Annual Meeting of the Society for Neuroscience, San Diego, CA
	Brain Collection Advisory Meeting, Stanley Medical Research Institute, Bethesda, MD
2008	32nd Winter Conference on the Neurobiology of Learning and Memory, Park City, UT
	James S. McDonnell Foundation Network Meeting, Washington, DC
	6th Federation of European Neuroscience Societies Forum, Geneva, Switzerland
	38th Annual Meeting of the Society for Neuroscience, Washington, DC
2009	33rd Winter Conference on the Neurobiology of Learning and Memory, Park City, UT
	Advances in Autism Conference, Mount Sinai School of Medicine, New York, NY
	Therapeutics for Cognitive Aging Symposium, New York Academy of Sciences, New York, NY
	James S. McDonnell Foundation Network Meeting, San Francisco, CA
	32nd Annual Meeting of the American Society of Primatologists, San Diego, CA
	39th Annual Meeting of the Society for Neuroscience, Chicago, IL
	CARTA Hominid Sample Research Resources Workshop, Salk Institute, La Jolla, CA
2010	34th Winter Conference on the Neurobiology of Learning and Memory, Park City, UT
	James S. McDonnell Foundation Network Meeting, Washington, DC
	World Science Festival, New York, NY

	Welker Memorial Symposium on Neurobehavioral Evolution, National Museum of Health and Medicine, Washington, DC
	Annual Meeting of the Cajal Club, Seattle, WA
	Brain Research Meeting on the Emerging Neuroscience of Autism Spectrum Disorders, San Diego, CA
	40th Annual Meeting of the Society for Neuroscience, San Diego, CA
	Children's Environmental Health Center Scientific Workshop on Autism and Learning Disabilities, Mount Sinai Medical Center, New York, NY
2011	35th Winter Conference on the Neurobiology of Learning and Memory, Park City, UT
	1st International Phelan-McDermid Syndrome Conference, New York, NY
	New York State Autism Consortium Meeting, IBR, Staten Island, NY
	James S. McDonnell Foundation Network Meeting, Washington, DC
	Molecular Neuroanatomy Workshop, Okinawa Institute of Science and Technology, Okinawa, Japan
	International Conference on Familial Dysautonomia, New York, NY
	41st Annual Meeting of the Society for Neuroscience, Washington, DC
2012	36th Winter Conference on the Neurobiology of Learning and Memory, Park City, UT
	Campaign for Mount Sinai, West Palm Beach, FL
	James S. McDonnell Foundation Network Meeting, Washington, DC
	Autism Speaks Brain Banking Workshops, Princeton, NJ; New York, NY
	42nd Annual Meeting of the Society for Neuroscience, New Orleans, LA
2013	37th Winter Conference on the Neurobiology of Learning and Memory, Park City, UT
	Autism Speaks Brain Banking Workshop, New York, NY
	32nd Annual Meeting of the J.B. Johnston Club, San Diego, CA
	24th Karger Workshop on Brain Evolution, San Diego, CA
	43rd Annual Meeting of the Society for Neuroscience, San Diego, CA
	Symposium Constantin Bouras, University of Geneva, Geneva, Switzerland
	DownSyndromeAchieves Foundation Workshop, Columbus, OH
	Autism BrainNet Workshop, Sacramento, CA
2014	International Meeting for Autism Research, Atlanta, GA
	Autism BrainNet Workshop, Dallas, TX; New York, NY
	Healthymagination Advisory Board Meeting and Media Track, General Electric Global Research Center, Niskayuna, NY
	Summit on Human Evolution, The Paul G. Allen Family Foundation, Seattle, WA
	44rd Annual Meeting of the Society for Neuroscience, Washington, DC

COLLABORATIONS

California Institute of Technology, Division of Biology, Pasadena, CA (Dr J.M. Allman)
 -Cellular basis, evolution, and pathology of social knowledge and emotions

University of Utah, Center for Integrated Neuroscience and Human Behavior, Salt Lake City, UT
 (Dr J.R. Korenberg)
 -Morphometry and connectivity of mouse models of mental retardation

Allen Institute for Brain Science, Seattle, WA (Dr E.S. Lein, Dr M.J. Hawrylycz, Dr J.G. Hohmann, Dr H. Zeng, Dr A.J. Guillozet-Bongaarts, Dr C. Koch, Dr A.R. Jones)
 -Gene expression mapping in the human brain

MBF Bioscience, Williston, VT (Dr J. Glaser); Ludwig-Maximilians University, Department of Anatomy, Munich, Germany (Dr C. Schmitz)

- Stereologic analyses in schizophrenia and autism
- Development of automatized stereology and high-resolution microscopy tools

University of California San Diego, Department of Neuroscience, La Jolla, CA (Dr E. Koo, Dr E. Masliah)

- Amyloid precursor protein role in neuronal plasticity

-Synucleins effects on basal ganglia circuits

University of California Davis, MIND Institute, Sacramento, CA (Dr C.M. Schumann, Dr D.G. Amaral); University of Texas Southwestern, Department of Psychiatry, Dallas, TX (Dr C.L. Tamminga); Beth Israel Deaconess Medical Center, Department of Pathology, Boston, MA (Dr M. Anderson); Autism Speaks, San Diego, CA (Dr J. Pickett)

- Development of Autism BrainNet, a brain-banking network for autism spectrum disorders

Barrows Neurological Institute, Phoenix, AZ (Dr A.D. Craig)

- Comparative anatomy of the thalamus and pain systems in primates

Colorado College, Department of Psychology, Colorado Springs, CO (Dr B. Jacobs)

- Quantitative and comparative Golgi analysis of cortical evolution in mammals

Yale University, Department of Neurobiology, New Haven, CT (Dr N. Sestan)

- Phylogenetic and molecular mechanisms of neocortical development and laminar specification

Princeton University, Department of Molecular Biology, Princeton, NJ (Dr S.S.H. Wang);

- Engineering principles and mammalian brain phylogeny

-Theoretical approaches of neural wiring in the mammalian neocortex

George Washington University, Department of Anthropology, Washington, DC (Dr C.C. Sherwood)

- Cortical organization, brain aging, neuropathology, and neurogenetics in great apes

-Quantitative analysis of hemispheric lateralization in primates

- Morphomolecular evolution of neural systems in the mammalian cerebral cortex

New York University, Department of Neurology, New York, NY (Dr H. Kaufmann, Dr F. Axelrod)

- Neuropathology of familial dysautonomia

Queens College, Department of Psychology (Dr J. Fan)

- Functional brain imaging of empathy networks

General Electric Global Research Center, Niskayuna, NY (Dr D. Meyer, Dr N. Ishaque)

- Connectomics and transcriptomics of vulnerable neurons in dementia

Boston University, Department of Neurobiology and Anatomy, Boston, MA (Dr J.I. Luebke); Franklin and Marshall College, Department of Mathematics, Lancaster, PA (Dr C.M. Weaver); University of New South Wales, School of Mathematics, Sydney, Australia (Dr B.I. Henry)

- Development of automatic tools for neuron reconstruction and visualization

-Sensitivity analysis of functionally characterized neocortical neurons

Uniformed Service School of Medicine, Department of Pathology, Bethesda, MD (Dr D.P. Perl)

- Quantitative analysis and clinical correlations of cases of Guamanian ALS/PD complex

-Stereologic investigations in the context of a human brain bank

-Neuropathology of brain trauma in Uniformed Service veterans

Icahn School of Medicine at Mount Sinai, Department of Neuroscience, NY (Dr J.H. Morrison)
 -Stereologic analysis of brain aging in primates
 -Quantitative analysis of the neurochemical phenotype of corticocortical connections in primates

Icahn School of Medicine at Mount Sinai, Department of Psychiatry, NY (Dr S. Gandy, Dr D.L. Dickstein, Dr M. Sano, Dr V. Haroutunian, Dr J. Buxbaum, Dr N.K. Robakis, Dr K.L. Davis, Dr G. Elder, Dr G.M. Pasinetti, Dr M. Gama Sosa, Dr J. Fan)
 -Neuropathologic quantitative investigations of chronic schizophrenia and autism
 -Neuropathologic quantitative investigations of Alzheimer's disease and aging
 -Neuropathology of traumatic brain injury and chronic traumatic encephalopathy
 -MRI, fMRI, and DTI investigations in cortical networks in autism, schizophrenia, and dementia

Icahn School of Medicine at Mount Sinai, Department of Radiology, NY (Dr T.P. Naidich, Dr C.Y. Tang)
 -Comparative MRI and DTI analysis of vertebrate brain organization
 -MicroMRI analysis of cytoarchitecture in the human cerebral cortex
 -MicroMRI analysis of pathologic changes in transgenic mouse models of Alzheimer's disease

Icahn School of Medicine at Mount Sinai, Center for Anatomy and Functional Morphology, NY (Dr J.S. Reidenberg); Emory University, Program in Neuroscience, Atlanta, GA (Dr L. Marino); National Marine Mammals Preservation Foundation, San Diego, CA (Dr S. Ridgway); Mystic Aquarium, Mystic, RI (Dr G. Sirpenski)
 -Comparative morphologic analysis of the central nervous system of marine mammals

Katholieke Universiteit Leuven, Department of Biology, Leuven, Belgium (Dr L. Arckens); Monash University, Department of Regenerative Medicine, Victoria, Australia (Dr J. Bourne)
 -Spatial and cellular organization of the visual thalamus in macaque monkeys

Linköping University, Department of Chemistry, Linköping, Sweden (Dr K.P.R. Nilsson); Charité University, Department of Neuropathology, Berlin, Germany (Dr F.L. Heppner); Mount Sinai School of Medicine, Department of Neurology, New York, NY (Dr S. Gandy)
 -Optical imaging of protein aggregates using luminescent conjugated polythiophenes

Karolinska Institutet, Department of Neuroscience, Stockholm, Sweden (Dr G. Innocenti); Warneford Hospital, Department of Psychiatry, Oxford, UK (Dr T.J. Crow, Dr S. Chance); Royal Museum of Central Africa, Tervuren, Belgium (Dr E.P.E. Gilissen); Max Planck Institute for Brain Research, Department of Neurophysiology, Frankfurt, Germany (Dr R.A.W. Galuske); Max Planck Institute, Laboratory of Computational Biology, Shanghai, China (Dr P. Khaitovich)
 -Comparative study of primate brain aging and allometry of the neocortex
 -Callosal connections and cortical architecture in primate evolution

J.W. Goethe Universität, Department of Anatomy III, Frankfurt, Germany (Dr H.H.A. Oelschläger); University of Padova, Department of Experimental Veterinary Science, Padova, Italy (Dr B. Cozzi)
 -Immunohistochemistry and stereology of the odontocete neocortex

University of the Witwatersrand, Department of Anatomical Sciences, South Africa (Dr P.R. Manger)
 -Comparative and quantitative neuroanatomy of large African mammals
 -Comparative and quantitative neuroanatomy of cetaceans

Croatian Institute for Brain Research, Zagreb, Croatia (Dr G. Simic)

-Quantitative neuropathology and molecular markers of brain degenerative disorders

University of Geneva School of Medicine, Department of Mental Health (Dr P. Giannakopoulos, Dr C. Bouras, Dr E. Kövari), and Geriatrics Hospital, Geneva, Switzerland (Dr G. Gold)

-Comparative neuropathological analysis of dementing disorders

-Quantitative analysis and clinicopathological correlations of normal brain aging

-Analysis of the brain microvasculature in aging and dementia

-Analysis of centenarians and atypical dementia

LIST OF PUBLICATIONS

THESIS

Medical Doctorate (Advisors, Profs P.J. Magistretti and †R.W. Straub):

Medical Thesis No. 7097, University of Geneva School of Medicine, Geneva, Switzerland

"Aspects de la régulation du métabolisme énergétique dans le cortex cérébral de la souris normale et épileptique" (Regulatory aspects of energy metabolism in the cerebral cortex of normal and epileptic mice), in French, viii + 146 pp., SRO-Kündig, Geneva, 1987.

ARTICLES (peer-reviewed)

1. Schorderet M., Hof P., Magistretti P.J. (1984) The effect of VIP on cyclic-AMP and glycogen levels in vertebrate retina. *Peptides* **5**, 295-298.
2. Magistretti P.J., Hof P., Schorderet M. (1984) The increase in cyclic-AMP levels elicited by vasoactive intestinal peptide (VIP) in mouse cerebral cortical slices is potentiated by ergot alkaloids. *Neurochem. Int.* **6**, 751-753.
3. Ofori S., Bretton C., Hof P., Schorderet M. (1986) Investigation of dopamine content, synthesis and release in rabbit retina in vitro. Part I: Effects of dopamine precursors, reserpine, amphetamine, L-dopa decarboxylase- and monoamine oxidase-inhibitors. *J. Neurochem.* **47**, 1199-1206.
4. Magistretti P.J., Hof P.R., Martin J.L. (1986) Adenosine stimulates glycogenolysis in mouse cerebral cortical slices: a possible coupling mechanism between neuronal activity and energy metabolism. *J. Neurosci.* **6**, 2558-2562.
5. Magistretti P.J., Hof P.R., Celio M.R. (1987) Noradrenergic sub-sensitivity in the cerebral cortex of the *tottering* mouse, a spontaneously epileptic mutant. *Brain Res.* **403**, 181-185.
6. Martin J.L., Dietl M.M., Hof P.R., Palacios J.M., Magistretti P.J. (1987) Autoradiographic mapping of (mono¹²⁵I) iodo-Tyr¹⁰, MetO¹⁷)-vasoactive intestinal peptide binding sites in the rat brain. *Neuroscience* **23**, 539-565.
7. Hof P.R., Pascale E., Magistretti P.J. (1988) K⁺ at concentrations reached in the extracellular space during neuronal activity promotes a Ca²⁺-dependent glycogen hydrolysis in mouse cerebral cortex. *J. Neurosci.* **8**, 1922-1928.

8. Magistretti P.J., Hof P.R., Martin J.L., Dietl M.M., Palacios J.M. (1988) High and low affinity binding sites for vasoactive intestinal peptide (VIP) in the rat kidney revealed by light microscopic autoradiography. *Regul. Peptides* **23**, 145-152.
9. Hof P.R., Celio M.R., Magistretti P.J. (1989) Age-dependent supersensitivity to the glycogenolytic effect of K⁺ in the cerebral cortex of the spontaneously epileptic mouse mutant *quaking*. *Dev. Brain Res.* **46**, 107-113.
10. Hof P.R., Bouras C., Constantinidis J., Morrison J.H. (1989) Balint's syndrome in Alzheimer's disease: specific disruption of the occipito-parietal visual pathway. *Brain Res.* **493**, 368-375.
11. Hof P.R., Bouras C., Constantinidis J., Morrison J.H. (1990) Selective disconnection of specific visual association pathways in cases of Alzheimer's disease presenting with Balint's syndrome. *J. Neuropathol. Exp. Neurol.* **49**, 168-184.
12. Bouras C., Vallet P.G., Hof P.R., Charnay Y., Golaz J., Constantinidis J. (1990) Substance P immunoreactivity in Alzheimer disease: a study in cases presenting symmetric or asymmetric cortical atrophy. *Alzheimer Dis. Assoc. Disord.* **4**, 24-34.
13. Dietl M.M., Hof P.R., Martin J.L., Magistretti P.J., Palacios J.M. (1990) Autoradiographic distribution of vasoactive intestinal peptide in the vertebrate central nervous system: a phylogenetic study. *Brain Res.* **520**, 14-26.
14. Hof P.R., Cox K., Morrison J.H. (1990) Quantitative analysis of a vulnerable subset of pyramidal neurons in Alzheimer's disease: I. Superior frontal and inferior temporal cortex. *J. Comp. Neurol.* **301**, 44-54.
15. Hof P.R., Morrison J.H. (1990) Quantitative analysis of a vulnerable subset of pyramidal neurons in Alzheimer's disease: II. Primary and secondary visual cortex. *J. Comp. Neurol.* **301**, 55-64.
16. Blümcke I., Hof P.R., Morrison J.H., Celio M.R. (1990) Distribution of parvalbumin immunoreactivity in the visual cortex of old world monkeys and humans. *J. Comp. Neurol.* **301**, 417-432.
17. Hof P.R., Dietl M.M., Charnay Y., Martin J.L., Bouras C., Palacios J.M., Magistretti P.J. (1991) Vasoactive intestinal peptide binding sites and fibers in the brain of the pigeon *Columba livia*: an autoradiographic and immunohistochemical study. *J. Comp. Neurol.* **305**, 393-411.
18. Campbell M.J., Hof P.R., Morrison J.H. (1991) A subpopulation of primate corticocortical neurons is distinguished by somatodendritic distribution of neurofilament protein. *Brain Res.* **539**, 133-136.
19. Hof P.R., Bouras C. (1991) Object recognition deficit in Alzheimer's disease: possible disconnection of the occipito-temporal component of the visual system. *Neurosci. Lett.* **122**, 53-56.
20. Hof P.R., Morrison J.H. (1991) Neocortical neuronal subpopulations labeled by a monoclonal antibody to calbindin exhibit differential vulnerability in Alzheimer's disease. *Exp. Neurol.* **111**, 293-301.

21. Hof P.R., Cox K., Young W.G., Celio M.R., Rogers J., Morrison J.H. (1991) Parvalbumin-immunoreactive neurons in the neocortex are resistant to degeneration in Alzheimer's disease. *J. Neuropathol. Exp. Neurol.* **50**, 451-462.
22. Blümcke I., Hof P.R., Morrison J.H., Celio M.R. (1991) Parvalbumin in the monkey striate cortex: a quantitative immunoelectron-microscopy study. *Brain Res.* **554**, 237-243.
23. Hof P.R., Knabe R., Bovier P., Bouras C. (1991) Neuropathological observations in a case of autism presenting with self-injury behavior. *Acta Neuropathol.* **82**, 321-326.
24. Hof P.R., Perl D.P., Loerzel A.J., Morrison J.H. (1991) Neurofibrillary tangle distribution in the cerebral cortex of parkinsonism-dementia cases from Guam: differences with Alzheimer's disease. *Brain Res.* **564**, 306-313.
25. Bouras C., Vallet P.G., Hof P.R. (1991) Asymmetric increase in substance P immunoreactivity in the rat and guinea pig substantia nigra after unilateral neocortical ablation. *Neurosci. Lett.* **133**, 53-56.
26. Vallet P.G., Guntern R., Hof P.R., Golaz J., Delacourte A., Robakis N.K., Bouras C. (1992) A comparative study of histological and immunohistochemical methods for neurofibrillary tangles and senile plaques in Alzheimer's disease. *Acta Neuropathol.* **83**, 170-178.
27. Guntern R., Bouras C., Hof P.R., Vallet P.G. (1992) An improved thioflavine S method for neurofibrillary tangles and senile plaques in Alzheimer's disease. *Experientia* **48**, 8-10.
28. Golaz J., Bouras C., Hof P.R. (1992) Motor cortex involvement in presenile dementia: report of a case. *J. Geriatr. Psychiatry Neurol.* **5**, 85-92.
29. Hof P.R., Charpiot A., Delacourte A., Buée L., Purohit D., Perl D.P., Bouras C. (1992) Distribution of neurofibrillary tangles and senile plaques in the cerebral cortex in postencephalitic parkinsonism. *Neurosci. Lett.* **139**, 10-14.
30. Hof P.R., Delacourte A., Bouras C. (1992) Distribution of cortical neurofibrillary tangles in progressive supranuclear palsy: a quantitative analysis of six cases. *Acta Neuropathol.* **84**, 45-51.
31. Hof P.R., Bierer L.M., Perl D.P., Delacourte A., Buée L., Bouras C., Morrison J.H. (1992) Evidence for early vulnerability of the medial and inferior aspects of the temporal lobe in an 82-year-old patient with preclinical signs of dementia — Regional and laminar distribution of neurofibrillary tangles and senile plaques. *Arch. Neurol.* **49**, 946-953.
32. Buée L., Hof P.R., Roberts D.D., Delacourte A., Morrison J.H., Fillit H.M. (1992) Immunohistochemical identification of thrombospondin in normal human brain and in Alzheimer's disease. *Am. J. Pathol.* **141**, 783-788.
33. Hof P.R., Glezer I.I., Archin N., Janssen W.G., Morgane P.J., Morrison J.H. (1992) The primary auditory cortex in cetacean and human brain: a comparative analysis of neurofilament protein-containing pyramidal neurons. *Neurosci. Lett.* **146**, 91-95.

34. Hof P.R., Nimchinsky E.A. (1992) Regional distribution of neurofilament and calcium-binding proteins in the cingulate cortex of the macaque monkey. *Cereb. Cortex* **2**, 456-467.
35. Glezer I.I., Hof P.R., Morgane P.J. (1992) Calretinin-immunoreactive neurons in the primary visual cortex of dolphin and human brains. *Brain Res.* **595**, 181-188.
36. Hof P.R., Bouras C., Buée L., Delacourte A., Perl D.P., Morrison J.H. (1992) Differential distribution of neurofibrillary tangles in the cerebral cortex of dementia pugilistica and Alzheimer's disease cases. *Acta Neuropathol.* **85**, 23-30.
37. Ginsberg S.D., Hof P.R., Young W.G., Morrison J.H. (1993) Noradrenergic innervation of the hypothalamus of rhesus monkeys: distribution of dopamine-β-hydroxylase-immunoreactive fibers and quantitative analysis of varicosities in the paraventricular nucleus. *J. Comp. Neurol.* **327**, 597-611.
38. Ginsberg S.D., Hof P.R., McKinney W.T., Morrison J.H. (1993) Quantitative analysis of tuberoinfundibular tyrosine hydroxylase- and corticotropin-releasing factor-immunoreactive neurons in monkeys raised with differential rearing conditions. *Exp. Neurol.* **120**, 95-105.
39. Hof P.R., Nimchinsky E.A., Celio M.R., Bouras C., Morrison J.H. (1993) Calretinin-immunoreactive neocortical interneurons are unaffected in Alzheimer's disease. *Neurosci. Lett.* **152**, 145-149.
40. Bouras C., Hof P.R., Morrison J.H. (1993) Neurofibrillary tangle densities in the hippocampal formation in a non-demented population define subgroups of patients with differential early pathologic changes. *Neurosci. Lett.* **153**, 131-135.
41. Glezer I.I., Hof P.R., Leranth C., Morgane P.J. (1993) Organization of GABA-containing neuronal populations in mammalian visual cortex: a comparative study in whales, insectivores, rodents and primates. *Cereb. Cortex* **3**, 249-272.
42. Giannakopoulos P., Hof P.R., Surini M., Michel J.P., Bouras C. (1993) Quantitative immunohistochemical analysis of the distribution of neurofibrillary tangles and senile plaques in the cerebral cortex of nonagenarians and centenarians. *Acta Neuropathol.* **85**, 602-610.
43. Siegel S.J., Ginsberg S.D., Hof P.R., Foote S.L., Young W.G., Kraemer G.W., McKinney W.T., Morrison J.H. (1993) Effects of social deprivation in prepubescent rhesus monkeys: immunohistochemical analysis of the neurofilament protein triplet in the hippocampal formation. *Brain Res.* **619**, 299-305.
44. Hof P.R., Archin N., Osmand A.P., Dougherty J.H., Wells C., Bouras C., Morrison J.H. (1993) Posterior cortical atrophy in Alzheimer's disease: analysis of a new case and re-evaluation of an historical report. *Acta Neuropathol.* **86**, 215-223.
45. Ginsberg S.D., Hof P.R., McKinney W.T., Morrison J.H. (1993) The noradrenergic innervation density of the monkey paraventricular nucleus is not altered by early social deprivation. *Neurosci. Lett.* **158**, 130-134.

46. Hof P.R., Bouras C., Perl D.P., Morrison J.H. (1994) Quantitative neuropathologic analysis of Pick's disease cases: cortical distribution of Pick bodies and coexistence with Alzheimer's disease. *Acta Neuropathol.* **87**, 115-124.
47. Ginsberg S.D., Hof P.R., Young W.G., Morrison J.H. (1994) Noradrenergic innervation of vasopressin- and oxytocin-containing neurons in the hypothalamic paraventricular nucleus of the macaque monkey: quantitative analysis using double-label immunohistochemistry and confocal laser microscopy. *J. Comp. Neurol.* **341**, 476-491.
48. Bouras C., Hof P.R., Giannakopoulos P., Michel J.P., Morrison J.H. (1994) Regional distribution of neurofibrillary tangles and senile plaques in the cerebral cortex of elderly patients: a quantitative evaluation of a one-year autopsy population from a geriatric hospital. *Cereb. Cortex* **4**, 138-150.
49. Giannakopoulos P., Hof P.R., Mottier S., Michel J.P., Bouras C. (1994) Neuropathologic changes in the cerebral cortex of 1258 cases from a geriatric hospital: retrospective clinicopathologic evaluation of a ten year autopsy population. *Acta Neuropathol.* **87**, 456-468.
50. Buée L., Hof P.R., Bouras C., Delacourte A., Perl D.P., Morrison J.H., Fillit H.M. (1994) Pathological alterations of the cerebral microvasculature in Alzheimer's disease and related dementing disorders. *Acta Neuropathol.* **87**, 469-480.
51. Leveugle B., Spik G., Perl D.P., Bouras C., Fillit H.M., Hof P.R. (1994) The iron-binding protein lactotransferrin is present in pathologic lesions in a variety of neurodegenerative disorders: a comparative immunohistochemical analysis. *Brain Res.* **650**, 20-31.
52. Hof P.R., Perl D.P., Loerzel A.J., Steele J.C., Morrison J.H. (1994) Amyotrophic lateral sclerosis and parkinsonism-dementia from Guam: differences in neurofibrillary tangle distribution and density in the hippocampal formation and neocortex. *Brain Res.* **650**, 107-116.
53. Giannakopoulos P., Hof P.R., Giannakopoulos A.S., Buée-Scherrer V., Surini M., Delacourte A., Bouras C. (1994) Dementia in the oldest-old: quantitative analysis of 12 cases from a psychiatric hospital. *Dementia* **5**, 348-356.
54. Hof P.R., Nimchinsky E.A., Buée-Scherrer V., Buée L., Nasrallah J., Hottinger A.F., Purohit D.P., Loerzel A.J., Steele J.C., Delacourte A., Bouras C., Morrison J.H., Perl D.P. (1994) Amyotrophic lateral sclerosis/parkinsonism-dementia complex of Guam: quantitative neuropathology, immunohistochemical analysis of neuronal vulnerability, and comparison with related neurodegenerative disorders. *Acta Neuropathol.* **88**, 397-404.
55. Giannakopoulos P., Hof P.R., Bouras C. (1994) Alzheimer's disease with asymmetric atrophy of the cerebral hemispheres: morphometric analysis of four cases. *Acta Neuropathol.* **88**, 440-447.
56. Hof P.R., Glezer I.I., Revishchin A.V., Bouras C., Charnay Y., Morgane P.J. (1995) Distribution of dopaminergic fibers and neurons in visual and auditory cortices of the harbor porpoise and pilot whale. *Brain Res. Bull.* **36**, 275-284.

57. Bierer L.M., Hof P.R., Purohit D., Carlin L., Schmeidler J.M., Davis K.L., Perl D.P. (1995) Neocortical neurofibrillary tangles correlate with dementia severity in Alzheimer's disease. *Arch. Neurol.* **52**, 81-88.
58. Hof P.R., Morrison J.H. (1995) Neurofilament protein defines regional patterns of cortical organization in the macaque monkey visual system: a quantitative immunohistochemical analysis. *J. Comp. Neurol.* **352**, 161-186.
59. Ripps M.E., Huntley G.W., Hof P.R., Morrison J.H., Gordon J.W. (1995) Transgenic mice expressing an altered murine superoxide dismutase gene provide an animal model of amyotrophic lateral sclerosis. *Proc. Natl. Acad. Sci. USA* **92**, 689-693.
60. Nimchinsky E.A., Vogt B.A., Morrison J.H., Hof P.R. (1995) Spindle neurons of the human anterior cingulate cortex. *J. Comp. Neurol.* **355**, 27-37.
61. Vickers J.C., Huntley G.W., Hof P.R., Bederson J., DeFelipe J., Heinemann S.F., Morrison J.H. (1995) Immunocytochemical localization of non-NMDA ionotropic excitatory amino acid receptor subunits in human neocortex. *Brain Res.* **671**, 175-180.
62. Giannakopoulos P., Hof P.R., Bouras C. (1995) Dementia lacking distinctive histopathology: clinicopathological evaluation of 32 cases. *Acta Neuropathol.* **89**, 346-355.
63. Hof P.R., Bouras C., Perl D.P., Sparks D.L., Mehta N., Morrison J.H. (1995) Age-related distribution of neuropathologic changes in the cerebral cortex of patients with Down's syndrome — Quantitative regional analysis and comparison with Alzheimer's disease. *Arch. Neurol.* **52**, 379-391.
64. Buée-Scherrer V., Buée L., Hof P.R., Leveugle B., Gilles C., Loerzel A.J., Perl D.P., Delacourte A. (1995) Neurofibrillary degeneration in amyotrophic lateral sclerosis/parkinsonism-dementia complex of Guam — Immunochemical characterization of tau proteins. *Am. J. Pathol.* **146**, 924-932.
65. Blümcke I., Wolf H.K., Hof P.R., Morrison J.H., Wiestler O.D. (1995) Regional distribution of the AMPA glutamate receptor subunit GluR2(4) in human hippocampus. *Brain Res.* **682**, 239-244.
66. Giannakopoulos P., Hof P.R., Vallet P.G., Giannakopoulos A.S., Charnay Y., Bouras C. (1995) Quantitative analysis of neuropathologic changes in the cerebral cortex of centenarians. *Prog. Neuro-Psychopharmacol. Biol. Psychiatry* **19**, 577-592.
67. Charnay Y., Léger L., Vallet P.G., Hof P.R., Jouvet M., Bouras C. (1995) [³H]Nisoxetine binding sites in the cat brain: an autoradiographic study. *Neuroscience* **69**, 259-270.
68. Hof P.R., Mufson E.J., Morrison J.H. (1995) The human orbitofrontal cortex: cytoarchitecture and quantitative immunohistochemical parcellation. *J. Comp. Neurol.* **359**, 48-68.
69. Vogt B.A., Nimchinsky E.A., Vogt L.J., Hof P.R. (1995) Human cingulate cortex: surface features, flat maps, and cytoarchitecture. *J. Comp. Neurol.* **359**, 490-506.
70. Hof P.R., Nimchinsky E.A., Morrison J.H. (1995) Neurochemical phenotype of corticocortical connections in the macaque monkey: quantitative analysis of a subset of

- neurofilament protein-immunoreactive projection neurons in frontal, parietal, temporal, and cingulate cortices. *J. Comp. Neurol.* **362**, 109-133.
71. Giannakopoulos P., Hof P.R., Bouras C. (1995) Age versus ageing as a cause of dementia. *Lancet* **346**, 1486-1487.
 72. Giannakopoulos P., Hof P.R., Giannakopoulos A.S., Herrmann F.R., Michel J.P., Bouras C. (1995) Regional distribution of neurofibrillary tangles and senile plaques in the cerebral cortex of very old patients. *Arch. Neurol.* **52**, 1150-1159.
 73. Delacourte A., Robitaille Y., Sergeant N., Buée L., Hof P.R., Wattez A., Laroche-Cholette A., Mathieu J., Chagnon P., Gauvreau D. (1996) Specific pathological tau protein variants characterize Pick's disease. *J. Neuropathol. Exp. Neurol.* **55**, 159-168.
 74. Buée L., Pérez-Tur J., Leveugle B., Buée-Scherrer V., Mufson E.J., Loerzel A.J., Chartier-Harlin M.C., Perl D.P., Delacourte A., Hof P.R. (1996) Apolipoprotein E in Guamanian amyotrophic lateral sclerosis/parkinsonism-dementia complex: genotype analysis and relationships to neuropathological changes. *Acta Neuropathol.* **91**, 247-253.
 75. Buée-Scherrer V., Hof P.R., Buée L., Leveugle B., Vermersch P., Perl D.P., Olanow C.W., Delacourte A. (1996) Hyperphosphorylated tau proteins differentiate corticobasal degeneration and Pick's disease. *Acta Neuropathol.* **91**, 351-359.
 76. Giannakopoulos P., Hof P.R., Savioz A., Guimon J., Antonarakis S.E., Bouras C. (1996) Early-onset dementias: genetic, clinical, and neuropathological characteristics. *Acta Neuropathol.* **91**, 451-465.
 77. Leveugle B., Faucheuix B.A., Bouras C., Nillesse N., Spik G., Hirsch E.C., Agid Y., Hof P.R. (1996) Cellular distribution of the iron-binding protein lactotransferrin in the mesencephalon of Parkinson's disease cases. *Acta Neuropathol.* **91**, 566-572.
 78. Hof P.R., Vissavajjhala P., Rosenthal R.E., Fiskum G., Morrison J.H. (1996) Distribution of glutamate receptor subunit proteins GluR2(4), GluR5/6/7 and NMDAR1 in the canine and primate cerebral cortex: a comparative immunohistochemical analysis. *Brain Res.* **723**, 77-89.
 79. Charnay Y., Léger L., Vallet P.G., Greggio B., Hof P.R., Jouvet M., Bouras C. (1996) Mapping of serotonin transporter messenger RNA-containing nerve cell populations in the cat brainstem. *J. Chem. Neuroanat.* **10**, 93-100.
 80. Hof P.R., Rosenthal R.E., Fiskum G. (1996) Distribution of neurofilament protein and calcium-binding proteins parvalbumin, calbindin, and calretinin in the canine hippocampus. *J. Chem. Neuroanat.* **11**, 1-12.
 81. Hof P.R., Bogaert Y.E., Rosenthal R.E., Fiskum G. (1996) Distribution of neuronal populations containing neurofilament protein and calcium-binding proteins in the canine neocortex: regional analysis and cell typology. *J. Chem. Neuroanat.* **11**, 81-98.
 82. Nimchinsky E.A., Hof P.R., Young W.G., Morrison J.H. (1996) Neurochemical, morphologic and laminar characterization of cortical projection neurons in the cingulate motor areas of the macaque monkey. *J. Comp. Neurol.* **374**, 136-160.

83. Bouras C., Giannakopoulos P., Good P.F., Hsu A., Hof P.R., Perl D.P. (1996) Laser microprobe mass analysis of trace elements in brain mineralizations and blood vessels in Fahr's disease. *Acta Neuropathol.* **92**, 351-357.
84. Vissavajjhala P., Janssen W.G.M., Hu Y., Gazzaley A.H., Moran T., Hof P.R., Morrison J.H. (1996) Synaptic distribution of AMPA-GluR2 subunit and its colocalization with calcium-binding proteins in rat cerebral cortex: an immunohistochemical analysis using a GluR2-specific monoclonal antibody. *Exp. Neurol.* **142**, 296-312.
85. Hof P.R., Ungerleider L.G., Webster M.J., Gattass R., Adams M.M., Sailstad C.A., Morrison J.H. (1996) Neurofilament protein is differentially distributed in subpopulations of corticocortical projection neurons in the macaque monkey visual pathways. *J. Comp. Neurol.* **376**, 112-127.
86. Giannakopoulos P., Hof P.R., Kövari E., Vallet P.G., Herrmann F.R., Bouras C. (1996) Distinct patterns of neuronal loss and Alzheimer's disease lesion distribution in elderly individuals older than 90 years. *J. Neuropathol. Exp. Neurol.* **55**, 1210-1220.
87. Blümcke I., Beck H., Scheffler B., Hof P.R., Morrison J.H., Wolf H.K., Schramm J., Elger C.E., Wiestler O.D. (1996) Altered distribution of α -amino-3-hydroxy-5-methyl-4-isoxazole propionate receptor subunit GluR2(4) and N-methyl-D-aspartate receptor subunit NMDAR1 in the hippocampus of patients with temporal lobe epilepsy. *Acta Neuropathol.* **92**, 576-587.
88. Charnay Y., Léger L., Greggio B., Vallet P.G., Hof P.R., Jouvet M., Bouras C. (1997) Autoradiographic distribution of [3 H]paroxetine binding sites in the cat brain. *Biogenic Amines* **13**, 39-54.
89. Charnay Y., Léger L., Vallet P.G., Greggio B., Hof P.R., Cesuglio R., Jouvet M., Bouras C. (1997) Mapping of 5HT1a receptor binding sites in the feline brain: a quantitative autoradiographic study using [3 H]8-OH-DPAT. *Biogenic Amines* **13**, 217-232.
90. Giannakopoulos P., Bouras C., Kövari E., Shioi J., Tezapsidis N., Hof P.R., Robakis N.K. (1997) Presenilin-1-immunoreactive neurons are preserved in late-onset Alzheimer's disease. *Am. J. Pathol.* **150**, 429-436.
91. Bouras C., Giannakopoulos P., Good P.F., Hsu A., Hof P.R., Perl D.P. (1997) Laser microprobe mass analysis of aluminum and iron in neurofibrillary tangles in dementia pugilistica: comparison with Alzheimer's disease. *Eur. Neurol.* **38**, 53-58.
92. Nimchinsky E.A., Vogt B.A., Morrison J.H., Hof P.R. (1997) Neurofilament and calcium-binding proteins in the human cingulate cortex. *J. Comp. Neurol.* **384**, 597-620.
93. Vickers J.C., Hof P.R., Schumer R.A., Wang R.F., Podos S.M., Morrison J.H. (1997) Magnocellular and parvocellular visual pathways are affected in a macaque monkey model of glaucoma. *Austral. N.Z. J. Ophthalmol.* **25**, 239-243.
94. Hof P.R., Ungerleider L.G., Adams M.M., Webster M.J., Gattass R., Blumberg D.M., Morrison J.H. (1997) Callosally-projecting neurons in the macaque monkey V1/V2 border are enriched in nonphosphorylated neurofilament protein. *Vis. Neurosci.* **14**, 981-987.

95. Buée-Scherrer V., Buée L., Leveugle B., Perl D.P., Vermersch P., Hof P.R., Delacourte A. (1997) Pathological τ proteins in postencephalitic parkinsonism: comparison with Alzheimer's disease and other neurodegenerative disorders. *Ann. Neurol.* **42**, 356-359.
96. Giannakopoulos P., Hof P.R., Michel J.P., Guimon J., Bouras C. (1997) Cerebral cortex pathology in aging and Alzheimer's disease: a quantitative survey of large hospital-based geriatric and psychiatric cohorts. *Brain Res. Rev.* **25**, 217-245.
97. Hof P.R., Vogt B.A., Bouras C., Morrison J.H. (1997) Atypical form of Alzheimer's disease with prominent posterior cortical atrophy: a review of lesion distribution and circuit disconnection in cortical visual pathways. *Vision Res.* **37**, 3609-3625.
98. Gazzaley A.H., Thakker M.M., Hof P.R., Morrison J.H. (1997) Preserved number of entorhinal cortex layer II neurons in aged macaque monkeys. *Neurobiol. Aging* **18**, 549-553.
99. Nimchinsky E.A., Hof P.R., Janssen W.G.M., Morrison J.H., Schmauss C. (1997) Expression of dopamine D₃ receptor dimers and tetramers in brain and in transfected cells. *J. Biol. Chem.* **272**, 29229-29237.
100. Morrison J.H., Hof P.R. (1997) Life and death of neurons in the aging brain. *Science* **278**, 412-419.
101. Li J.J., Dickson D., Hof P.R., Vlassara H. (1998) Receptors for advanced glycosylation endproducts in human brain: role in brain homeostasis. *Mol. Med.* **4**, 46-60.
102. Stein D.J., Buchsbaum M.S., Hof P.R., Siegel Jr B.V., Shihabuddin L. (1998) Greater metabolic rate decreases in hippocampal formation and proisocortex than in neocortex in Alzheimer's disease. *Neuropsychobiology* **37**, 10-19.
103. Giannakopoulos P., Kövari E., French L.E., Viard I., Hof P.R., Bouras C. (1998) Possible neuroprotective role of clusterin in Alzheimer's disease: a quantitative immunocytochemical study. *Acta Neuropathol.* **95**, 387-394.
104. Giannakopoulos P., Duc M., Gold G., Hof P.R., Michel J.P., Bouras C. (1998) Pathologic correlates of apraxia in Alzheimer disease. *Arch. Neurol.* **55**, 689-695.
105. Vogt B.A., Vogt L.J., Vrana K.E., Gioia L., Meadows R.S., Challa V.R., Hof P.R., Van Hoesen G.W. (1998) Multivariate analysis of laminar patterns of neurodegeneration in posterior cingulate cortex. *Exp. Neurol.* **153**, 8-22.
106. Hof P.R., Lee P.Y., Yeung G., Wang R.F., Podos S.M., Morrison J.H. (1998) Glutamate receptor subunits GluR2 and NMDAR1 immunoreactivity in the retina of macaque monkeys with experimental glaucoma does not identify vulnerable neurons. *Exp. Neurol.* **153**, 234-241.
107. Glezer I.I., Hof P.R., Morgane P.J. (1998) Comparative analysis of calcium-binding protein-immunoreactive neuronal populations in the visual and auditory systems of the bottlenose dolphin (*Tursiops truncatus*) and macaque monkey (*Macaca fascicularis*). *J. Chem. Neuroanat.* **15**, 203-237.

108. Hof P.R., Glezer I.I., Condé F., Flagg R.A., Rubin M.B., Nimchinsky E.A., Vogt Weisenhorn D.M. (1999) Cellular distribution of the calcium-binding proteins parvalbumin, calbindin, and calretinin in the neocortex of mammals: phylogenetic and developmental patterns. *J. Chem. Neuroanat.* **16**, 77-116.
109. Giannakopoulos P., Gold G., Duc M., Michel J.P., Hof P.R., Bouras C. (1999) Neuroanatomical correlates of visual agnosia in Alzheimer's disease: a clinicopathological study. *Neurology* **52**, 71-77.
110. Pérez-Tur J., Buée L., Morris H.R., Waring S.C., Onstead L., Wavrant-De Vrièze F., Crook R., Buée-Scherrer V., Hof P.R., Petersen R.C., McGeer P.L., Delacourte A., Hutton M., Siddique T., Ahlskog J.E., Hardy J., Steele J.C. (1999) Neurodegenerative diseases of Guam: analysis of TAU. *Neurology* **53**, 411-413.
111. Nimchinsky E.A., Gilissen E., Allman J.M., Perl D.P., Erwin J.M., Hof P.R. (1999) A neuronal morphologic type unique to humans and great apes. *Proc. Natl. Acad. Sci. USA* **96**, 5268-5273.
112. Bussière T., Hof P.R., Mailliot C., Brown C.D., Caillet-Boudin M.L., Perl D.P., Buée L., Delacourte A. (1999) Phosphorylated serine 422 on tau proteins is a pathological epitope found in several diseases with neurofibrillary degeneration. *Acta Neuropathol.* **97**, 221-230.
113. Giannakopoulos P., Kövari E., Savioz A., De Bilbao F., Dubois-Dauphin M., Hof P.R., Bouras C. (1999) Differential distribution of presenilin-1, Bax, and Bcl-X_L in Alzheimer's disease and frontotemporal dementia. *Acta Neuropathol.* **98**, 141-149.
114. Giannakopoulos P., Kövari E., Buée L., Shioi J., Hof P.R., Robakis N.R., Bouras C., (1999) Presenilin-1 expression in Pick's disease. *Acta Neuropathol.* **98**, 488-492.
115. O'Donnell K.A., Rapp P.R., Hof P.R. (1999) The volume of prefrontal cortex area 46 is preserved during aging in macaque monkeys. *Exp. Neurol.* **160**, 300-310.
116. Bogaert Y.B., Sheu K.F.R., Hof P.R., Brown A.M., Blass J.P., Rosenthal R.E., Fiskum G. (2000) Neuronal subclass-selective loss of pyruvate dehydrogenase immunoreactivity following canine cardiac arrest and resuscitation. *Exp. Neurol.* **161**, 115-126.
117. Nimchinsky E.A., Young W.G., Yeung G., Shah R.A., Gordon J.W., Bloom F.E., Morrison J.H., Hof P.R. (2000) Differential vulnerability of oculomotor, facial, and hypoglossal nuclei in G86R superoxide dismutase transgenic mice. *J. Comp. Neurol.* **416**, 112-125.
118. Adams M.M., Hof P.R., Gattass R., Webster M.J., Ungerleider L.G. (2000) Visual cortical projections and chemoarchitecture of macaque monkey pulvinar. *J. Comp. Neurol.* **419**, 377-393.
119. Hof P.R., Nimchinsky E.A., Young W.G., Morrison J.H. (2000) Numbers of Meynert and layer IVB cells in area V1: a stereologic analysis in young and aged macaque monkeys. *J. Comp. Neurol.* **420**, 113-126.
120. Mittoux V., Joseph J.M., Condé F., Palfi S., Dautry C., Poyot T., Bloch J., Déglon N., Ouary S., Nimchinsky E.A., Brouillet E., Hof P.R., Peschanski M., Aebischer P., Hantraye

- P. (2000) Restauration of cognitive and motor functions with ciliary neurotrophic factor in a primate model of Huntington's disease. *Hum. Gene Ther.* **11**, 1177-1187.
121. Jung M.Y., Hof P.R., Schmauss C. (2000) The targeted disruption of the dopamine D₂ and D₃ receptor genes leads to different alterations in the expression of striatal calbindin-D_{28K}. *Neuroscience* **97**, 495-504.
122. Gold G., Bouras C., Kövari E., Canuto A., González Glaría B., Malky A., Hof P.R., Michel J.P., Giannakopoulos P. (2000) Clinical validity of Braak neuropathological staging in the oldest-old. *Acta Neuropathol.* **99**, 579-582.
123. Giannakopoulos P., Gold G., Duc M., Michel J.P., Hof P.R., Bouras C. (2000) Neural substrates of spatial and temporal disorientation in Alzheimer's disease. *Acta Neuropathol.* **100**, 189-195.
124. Giannakopoulos P., Gold G., Duc M., Michel J.P., Hof P.R., Bouras C. (2000) Impaired processing of famous faces in Alzheimer's disease is related to neurofibrillary tangle densities in the prefrontal and anterior cingulate cortex. *Dement. Geriatr. Cogn. Disord.* **11**, 336-341.
125. Buée L., Bussière T., Delacourte A., Buée-Scherrer V., Hof P.R. (2000) Tau proteins: physiology and involvement in neurodegenerative diseases. *Brain Res. Rev.* **33**, 95-130.
126. Hof P.R., Glezer I.I., Nimchinsky E.A., Erwin J.M. (2000) Neurochemical and cellular specializations in the mammalian neocortex reflect phylogenetic relationships: evidence from cetaceans, artiodactyls, and primates. *Brain Behav. Evol.* **55**, 300-310.
127. Haznedar M.M., Buchsbaum M.S., Wei T.C., Hof P.R., Cartwright C., Bienstock C.A., Hollander E. (2000) Limbic circuitry in autism spectrum disorders studied with positron emission tomography and magnetic resonance imaging. *Am. J. Psychiatry* **157**, 1994-2001.
128. Perl D.P., Good P.F., Bussière T., Morrison J.H., Erwin J.M., Hof P.R. (2000) Practical approaches to stereology in the setting of aging- and disease-related brain banks. *J. Chem. Neuroanat.* **20**, 7-19.
129. Schmitz C., Hof P.R. (2000) Recommendations for straightforward and rigorous methods of counting neurons based on a computer simulation approach. *J. Chem. Neuroanat.* **20**, 93-114.
130. Léger L., Charnay Y., Hof P.R., Bouras C., Cesuglio R. (2001) Distribution of serotonin-containing neurons and axons in the central nervous system of the cat. *J. Comp. Neurol.* **433**, 157-182.
131. Walker R.H., Gujari P., Hof P.R., Brin M.F., Olanow C.W., Shashidharan P. (2001) Distribution and immunohistochemical characterization of torsinA-immunoreactive neurons in rat and macaque monkey brain. *Brain Res.* **900**, 348-354.
132. Hof P.R., Nimchinsky E.A., Perl D.P., Erwin J.M. (2001) An unusual population of pyramidal neurons in the anterior cingulate cortex of hominids contains the calcium-binding protein calretinin. *Neurosci. Lett.* **307**, 139-142.

133. He Y., Hof P.R., Janssen W.G.M., Rothstein J.D., Morrison J.H. (2001) Differential synaptic localization of GluR2 and EAAC1 in the macaque monkey entorhinal cortex: a postembedding immunogold study. *Neurosci. Lett.* **311**, 161-164.
134. Bouras C., Kövari E., Riederer, B.M., Hof P.R., Giannakopoulos P. (2001) Morphological alterations in the anterior cingulate cortex in drug-naïve patients with schizophrenia and bipolar disorder. *Acta Neuropathol.* **102**, 373-379.
135. Vogt B.A., Vogt L.J., Perl D.P., Hof P.R. (2001) Cytoarchitecture of human caudomedial cingulate, retrosplenial, and caudal parahippocampal cortices. *J. Comp. Neurol.* **438**, 353-376.
136. Gold G., Kövari E., Corte G., Herrmann F.R., Canuto A., Bussière T., Hof P.R., Bouras C., Giannakopoulos P. (2001) Clinical validity of A β -protein deposition staging in brain aging and Alzheimer's disease. *J. Neuropathol. Exp. Neurol.* **60**, 946-952.
137. He Y., Hof P.R., Janssen W.G.M., Vissavajjhala P., Morrison J.H. (2001) Excitatory synapses demonstrate differential densities of AMPA receptor subunits GluR2 on GABAergic and pyramidal neurons in the monkey visual cortex. *Brain Res.* **921**, 60-67.
138. Page T.L., Einstein M., Duan H., He Y., Flores T., Rolshud D., Erwin J.M., Wearne S.L., Morrison J.H., Hof P.R. (2002) Morphological alterations in neurons forming corticocortical projections in the neocortex of aged patas monkeys. *Neurosci. Lett.* **317**, 37-41.
139. Gold G., Bouras C., Canuto A., Bergallo M.F., Herrmann F.R., Hof P.R., Mayor P.A., Michel J.P., Giannakopoulos P. (2002) Clinicopathologic validation study of four sets clinical criteria for vascular dementia. *Am. J. Psychiatry* **159**, 82-87.
140. Hof P.R., Duan H., Page T.L., Einstein M., Wicinski B., He Y., Erwin J.M., Morrison J.H. (2002) Age-related changes in GluR2 and NMDAR1 glutamate receptor subunit protein immunoreactivity in corticocortically projecting neurons in macaque and patas monkeys. *Brain Res.* **928**, 175-186.
141. Stepanyants A., Hof P.R., Chklovskii D.B. (2002) Geometry and structural plasticity of synaptic connectivity. *Neuron* **34**, 275-288.
142. Sanders, G.S., Gallup Jr. G.G., Heinzen H., Hof P.R., Schmitz C. (2002) Cognitive deficits, schizophrenia, and the anterior cingulate cortex. *Trends Cognit. Neurosci.* **6**, 190-192.
143. Bussière T., Friend P.D., Sadeghi N., Wicinski B., Lin G.I., Bouras C., Giannakopoulos P., Robakis N.K., Morrison J.H., Perl D.P., Hof P.R. (2002) Stereologic assessment of the total cortical volume occupied by amyloid deposits and its relationship with cognitive status in aging and Alzheimer's disease. *Neuroscience* **112**, 75-91.
144. Moga D., Hof P.R., Vissavajjhala P., Moran T.M., Morrison J.H. (2002) Parvalbumin-containing interneurons in rat hippocampus have an AMPA receptor profile suggestive of vulnerability to excitotoxicity. *J. Chem. Neuroanat.* **23**, 249-253.
145. Wen P.H., Shao X., Shao Z., Hof P.R., Wisniewski T., Kelley K., Friedrich Jr V.L., Ho L., Pasinetti G.M., Robakis N.K., Elder G.A. (2002) Overexpression of wild type but not of an

- FAD mutant presenilin-1 promotes hippocampal neurogenesis in adult mice. *Neurobiol. Disease* **10**, 8-19.
146. Glickstein S.B., Hof P.R., Schmauss C. (2002) Mice lacking dopamine D₂ and D₃ receptors have spatial working memory deficits. *J. Neurosci.* **22**, 5619-5629.
 147. Stepanyants A., Hof P.R., Chklovskii D.B. (2002) Information storage capacity of synaptic connectivity patterns. *Neurocomputing* **44-46**, 661-665.
 148. Vuilleumier N., Kövari E., Michon A., Mentenopoulos G., Hof P.R., Giannakopoulos P., Bouras C. (2002) Neuropathological analysis of an adult case of Cornelia de Lange syndrome. *Acta Neuropathol.* **104**, 327-332.
 149. Schmitz C., Grolms N., Boehringer R., Glaser J., Hof P.R., Korr H. (2002) Altered spatial arrangement of layer V pyramidal cells in the mouse brain following prenatal low-dose X-irradiation. A stereologic study using a novel three-dimensional tool to estimate the nearest neighbour distance distribution function of cells in thick sections. *Cereb. Cortex* **12**, 954-960.
 150. Duan H., Wearne S.L., Morrison J.H., Hof P.R. (2002) Quantitative analysis of the dendritic morphology of corticocortical projection neurons in the macaque monkey association cortex. *Neuroscience* **114**, 349-359.
 151. Hof P.R., Perl D.P. (2002) Neuropathologic changes in the primary motor cortex in Guamanian amyotrophic lateral sclerosis/parkinsonism-dementia complex. *Neurosci. Lett.* **328**, 294-298.
 152. Fatterpekar G.M., Naidich T.P., Delman B.N., Aguinaldo J.G., Gultekin S.H., Sherwood C.C., Hof P.R., Drayer B.P., Fayad Z.A. (2002) Cytoarchitecture of the human cerebral cortex: MR microscopy of excised specimens at 9.4 Tesla. *Am. J. Neuroradiol.* **23**, 1313-1321.
 153. Hof P.R., Haroutunian V., Copland C., Davis K.L., Buxbaum J.D. (2002) Molecular and cellular evidence for an oligodendrocyte abnormality in schizophrenia. *Neurochem. Res.* **27**, 1193-1200.
 154. Harrison K.H., Hof P.R., Wang S.S.H. (2002) Scaling laws in the mammalian neocortex: does form provide clues to function? *J. Neurocytol.* **31**, 289-298.
 155. DeFelipe J., Elston G.N., Fujita I., Fuster J., Harrison K.H., Hof P.R., Kawaguchi Y., Martin K.A.C., Rockland K.S., Thomson A.M., Wang S.S.H., White E.L., Yuste R. (2002) Neocortical circuits: evolutionary aspects and specificity versus non-specificity of synaptic connections. Remarks, main conclusions and general comments and discussion. *J. Neurocytol.* **31**, 387-416.
 156. Bouras C., Riederer B.M., Hof P.R., Giannakopoulos P. (2003) Induction of MC-1 immunoreactivity in axons after injection of the Fc fragment of human immunoglobulins in macaque monkeys. *Acta Neuropathol.* **105**, 58-64.
 157. Hof P.R., Bussière T., Gold G., Kövari E., Giannakopoulos P., Bouras C., Perl D.P., Morrison J.H. (2003) Stereologic evidence for persistence of viable neurons in layer II of

- the entorhinal cortex and the CA1 field in Alzheimer disease. *J. Neuropathol. Exp. Neurol.* **62**, 55-67.
158. Perl D.P., Hof P.R., Purohit D.P., Loerzel A., Kakulas B. (2003) Hippocampal and entorhinal cortex neurofibrillary tangle formation in Guamanian Chamorros free of overt neurologic dysfunction. *J. Neuropathol. Exp. Neurol.* **62**, 381-388.
159. Bussière T., Gold G., Kövari E., Giannakopoulos P., Bouras C., Perl D.P., Morrison J.H., Hof P.R. (2003) Stereologic analysis of neurofibrillary tangle formation in prefrontal cortex area 9 in aging and Alzheimer's disease. *Neuroscience* **117**, 577-592.
160. Pham K., Nacher J., Hof P.R., McEwen B.S. (2003) Repeated restraint stress suppresses neurogenesis and induces biphasic PSA-NCAM expression in the adult rat dentate gyrus. *Eur. J. Neurosci.* **17**, 879-886.
161. Rivara C.B., Sherwood C.C., Bouras C., Hof P.R. (2003) Stereologic characterization and spatial distribution patterns of Betz cells in the human primary motor cortex. *Anat. Rec.* **270A**, 137-151.
162. Sherwood C.C., Broadfield D.C., Holloway R.L., Gannon P.J., Hof P.R. (2003) Variability of Broca's area homologue in African great apes: implications for language evolution. *Anat. Rec.* **271**, 276-285.
163. Sherwood C.C., Lee P.W.H., Rivara C.B., Holloway R.L., Gilissen E.P.E., Simmons R.M.T., Hakeem A., Allman J.M., Erwin J.M., Hof P.R. (2003) Evolution of specialized pyramidal neurons in primate visual and motor cortex. *Brain Behav. Evol.* **61**, 28-44.
164. Rodriguez A., Ehlenberger D., Kelliher K., Einstein M., Henderson S.C., Morrison J.H., Hof P.R., Wearne S.L. (2003) Automated reconstruction of three-dimensional neuronal morphology from laser scanning microscopy images. *Methods* **30**, 94-105.
165. Rosenthal R.E., Silbergliit R., Hof P.R., Haywood Y., Fiskum G. (2003) Neuroprotective effect of hyperbaric oxygen after global cerebral ischemia: correlation of behavioral outcome, histopathology, and cerebral oxygen metabolism. *Stroke* **34**, 1311-1316.
166. Giannakopoulos P., Herrmann F.R., Bussière T., Bouras C., Kövari E., Perl D.P., Morrison J.H., Gold G., Hof P.R. (2003) Tangle and neuron numbers, but not amyloid load, predicts cognitive status in Alzheimer's disease. *Neurology* **60**, 1495-1501.
167. Davis K.L., Stewart D.G., Friedman J.I., Buchsbaum M., Harvey P.D., Hof P.R., Buxbaum J., Haroutunian V. (2003) White matter changes in schizophrenia — Evidence for myelin-related dysfunction. *Arch. Gen. Psychiatry* **60**, 443-456.
168. Moga D., Janssen W.G.M., Vissavajjhala P., Czelusniak S., Moran T.M., Hof P.R., Morrison J.H. (2003) Glutamate receptor subunit 3 (GluR3) immunoreactivity delineates a subpopulation of parvalbumin-containing interneurons in rat hippocampus. *J. Comp. Neurol.* **462**, 15-28.
169. Kövari E., Gold G., Herrmann F.R., Canuto A., Hof P.R., Bouras C., Giannakopoulos P. (2003) Lewy body densities in the entorhinal cortex and Brodmann area 24 predict cognition in Parkinson's disease. *Acta Neuropathol.* **106**, 83-88.

170. Bussière T., Giannakopoulos P., Bouras C., Perl D.P., Morrison J.H., Hof P.R. (2003) Progressive degeneration of nonphosphorylated neurofilament protein-enriched pyramidal neurons predicts cognitive impairment in Alzheimer's disease: a stereologic analysis of prefrontal cortex area 9. *J. Comp. Neurol.* **463**, 281-302.
171. Hof P.R., Haroutunian V., Friedrich Jr. V.L., Byne W., Buitron C., Perl D.P., Davis K.L. (2003) Loss and altered spatial distribution of oligodendrocytes in the superior frontal gyrus in schizophrenia. *Biol. Psychiatry* **53**, 1075-1085.
172. Duan H., Wearne S.L., Rocher A.B., Macedo A., Morrison J.H., Hof P.R. (2003) Age-related morphologic alterations in dendrites and spine densities of corticocortically projecting neurons in macaque monkeys. *Cereb. Cortex* **13**, 950-961.
173. Head E., Lott I.T., Hof P.R., Bouras C., Su J.H., Kim R., Haier R., Cotman C.W. (2003) Parallel compensatory and pathological events associated with tau pathology in middle aged individuals with Down syndrome. *J. Neuropathol. Exp. Neurol.* **62**, 917-926.
174. Hao J., Janssen W.G.M., Tang Y., Roberts J.A., McKay H., Lasley B., Allen P.B., Greengard P., Rapp P.R., Kordower J.H., Hof P.R., Morrison J.H. (2003) Estrogen increases the number of spinophilin-immunoreactive spines in the hippocampus of young and aged female rhesus monkeys. *J. Comp. Neurol.* **465**, 540-550.
175. Chakraborty T.R., Hof P.R., Ng L., Gore A.C. (2003) Stereologic analysis of estrogen receptor alpha (ER α) expression in rat hypothalamus and its regulation by aging and estrogen. *J. Comp. Neurol.* **466**, 409-421.
176. Tang Y., Janssen W.G.M., Hao J., Roberts J.A., McKay H., Lasley B., Allen P.B., Greengard P., Rapp P.R., Kordower J.H., Hof P.R., Morrison J.H. (2004) Estrogen replacement increases spinophilin-immunoreactive spine number in the prefrontal cortex of female rhesus monkeys. *Cereb. Cortex* **14**, 215-223.
177. Sherwood C.C., Holloway R.L., Erwin J.M., Schleicher A., Zilles K., Hof P.R. (2004) Cortical orofacial motor representation in Old World monkeys, great apes, and humans. I: Quantitative cytoarchitectural analysis of primary motor cortex. *Brain Behav. Evol.* **63**, 61-81.
178. Sherwood C.C., Holloway R.L., Erwin J.M., Hof P.R. (2004) Cortical orofacial motor representation in Old World monkeys, great apes, and humans. II: Stereologic analysis of chemoarchitecture. *Brain Behav. Evol.* **63**, 82-106. Erratum, *Brain Behav. Evol.* **65**, 71-72, 2005.
179. Bai L., Hof P.R., Standaert D.G., Xing Y., Nelson S.E., Young A.B., Magnusson K.R. (2004) Changes in the expression of the NR2B subunit during aging in macaque monkeys. *Neurobiol. Aging* **25**, 201-208.
180. Kövari E., Gold G., Herrmann F.R., Hof P.R., Bouras C., Giannakopoulos P. (2004) Cortical microinfarcts and demyelination significantly affect cognition in brain aging. *Stroke* **35**, 410-414.
181. Uddin M., Wildman D.E., Liu G., Xu W., Johnson R.M., Hof P.R., Kapatos G., Grossman L.I., Goodman M. (2004) Sister-grouping of chimpanzees and humans as revealed by

- genome-wide phylogenetic analysis of brain gene expression profiles. *Proc. Natl. Acad. Sci. USA* **101**, 2957-2962.
182. Radley J.J., Sisti H.M., Hao J., Rocher A.B., McCall T., Hof P.R., McEwen B.S., Morrison J.H. (2004) Chronic behavioral stress induces apical dendritic reorganization in pyramidal neurons of the medial prefrontal cortex. *Neuroscience* **125**, 1-6.
 183. Ho L., Pompl P., Xiang Z., Qin W., Wang J., Zhao Z., Yen Q., Rocher A.B., Cambareri G., Mobbs C.V., Hof P.R., Pasinetti G.M. (2004) Diet-induced insulin resistance promotes amyloidosis in a transgenic mouse model of Alzheimer's disease. *FASEB J.* **18**, 902-904; full text version (24 pp.) available at <http://www.fasebj.org/cbi/doi/10.1096/fj.03-0978fje>.
 184. Sebeo J., Perl D.P., Hof P.R. (2004) Occurrence of α -synuclein pathology in the cerebellum of Guamanian patients with parkinsonism-dementia complex. *Acta Neuropathol.* **107**, 497-503.
 185. Weaver C.M., Lindquist W.B., Hof P.R., Wearne S.L. (2004) Automated algorithms for multiscale morphometry of neuronal dendrites. *Neural Comput.* **16**, 1353-1383.
 186. Colombo J.A., Sherwood C.C., Hof P.R. (2004) Interlaminar astroglial processes in the cerebral cortex of great apes. *Anat. Embryol.* **208**, 215-218.
 187. Sherwood C.C., Cranfield M.R., Mehlman P.T., Lilly A.A., Garbe J., Rein T.R., Bruner H.J., Holloway R.L., Tang C.Y., Naidich T.P., Delman B.N., Erwin J.M., Whittier C., Nutter F., Hof P.R. (2004) Brain structure variation of great apes, with attention to the mountain gorilla (*Gorilla beringei beringei*). *Am. J. Primatol.* **63**, 149-164.
 188. Wen P.H., Hof P.R., Chen X., Gluck K., Austin G., Younkin S.G., Younkin L.H., DeGasperi R., Gama Sosa M.A., Robakis N.K., Haroutunian V., Elder G. (2004) The presenilin-1 familial Alzheimer's disease mutant P117L impairs neurogenesis in the hippocampus of adult mice. *Exp. Neurol.* **188**, 224-237.
 189. von Gunten A., Miklossy J., Suvà M.L., Hof P.R., Giannakopoulos P. (2004) Reduplicative paramnesia for places in a case of atypical Alzheimer's disease. *J. Neurol.* **251**, 750-752.
 190. Hof P.R., Morrison J.H. (2004) The aging brain: morphomolecular senescence of cortical circuits. *Trends Neurosci.* **27**, 607-613.
 191. Marino L., Sherwood C.C., Delman B.N., Tang C.Y., Naidich T.P., Hof P.R. (2004) Neuroanatomy of the killer whale (*Orcinus orca*) from magnetic resonance images. *Anat. Rec.* **281A**, 1256-1263.
 192. Palmen S.J.M.C., van Engeland H., Hof P.R., Schmitz C. (2004) Neuropathologic findings in autism. *Brain* **127**, 2572-2583.
 193. Chan P., Gonzalez-Maeso J., Ruf F., Bishop D.F., Hof P.R., Sealton S.C. (2005) ε -Sarcoglycan immunoreactivity and mRNA expression in mouse brain. *J. Comp. Neurol.* **482**, 50-73.
 194. Janssen W.G.M., Vissavajjhala P., Andrews G., Moran T., Hof P.R., Morrison J.H. (2005) Cellular and synaptic distribution of NR2A and NR2B in macaque monkey and rat

- hippocampus as visualized using subunit-specific monoclonal antibodies. *Exp. Neurol.* **191**, Suppl. 1, 28-44.
195. Wang J., Ho L., Qin W., Rocher A.B., Seror I., Humala N., Maniar K., Dolios G., Wang R., Hof P.R., Pasinetti G.M. (2005) Low carbohydrate caloric restriction attenuates β -amyloid neuropathology in a mouse model of Alzheimer's disease. *FASEB J.* **19**, 659-661; full text version (18 pp.) available at <http://www.fasebj.org/cbi/doi/10.1096/fj.04-3182fje>.
 196. Haznedar M.M., Roversi F., Pallanti S., Baldini-Rossi N., Schnur D.B., LiCalzi E., Tang C., Hof P.R., Hollander E., Buchsbaum M.S. (2005) Fronto-thalamo-striatal gray and white matter volume and anisotropy of their connections in bipolar spectrum illnesses. *Biol. Psychiatry* **57**, 733-742.
 197. Schmitz C., Hof P.R. (2005) Design-based stereology in neuroscience. *Neuroscience* **130**, 813-831.
 198. Simic G., Bexheti S., Kos M., Kelovic Z., Grbic K., Hof P.R., Kostovic I. (2005) Hemispheric asymmetry, modular variability and age-related changes in the human entorhinal cortex. *Neuroscience* **130**, 911-925.
 199. Schmitz C., Born M., Dolezel P., Rutten B.P.F., de Saint-Georges L., Hof P.R., Korr H. (2005) Prenatal protracted gamma irradiation at very low dose rate induces severe neuronal loss in rat hippocampus and cerebellum. *Neuroscience* **130**, 935-948.
 200. Sherwood C.C., Hof P.R., Holloway R.L., Semendeferi K., Gannon P.J., Frahm H., Zilles K. (2005) Evolution of the brainstem orofacial motor system in primates: a comparative quantitative study of trigeminal, facial and hypoglossal motor nuclei. *J. Hum. Evol.* **48**, 45-84.
 201. Sherwood C.C., Holloway R.L., Semendeferi K., Hof P.R. (2005) Is prefrontal white matter enlargement a human evolutionary specialization? [Correspondence] *Nature Neurosci.* **8**, 537-538.
 202. Andorfer C.A., Acker C.M., Kress Y., Hof P.R., Duff K., Davies P. (2005) Cell cycle re-entry and cell death in transgenic mice expressing non-mutant human tau isoforms. *J. Neurosci.* **25**, 5466-5464.
 203. Glickstein S.B., DeSteno D.A., Hof P.R., Schmauss C. (2005) Mice lacking dopamine D2 and D3 receptors exhibit differential activation of prefrontal cortical neurons during tasks requiring attention. *Cereb. Cortex* **15**, 1016-1025.
 204. Kreczmanski P., Schmidt-Kastner R., Heinsen H., Steinbusch H.M.W., Hof P.R., Schmitz C. (2005) Stereological studies of capillary length density in the frontal cortex of schizophrenics. *Acta Neuropathol.* **109**, 510-518.
 205. Gold G., Kövari E., Herrmann F.R., Canuto A., Hof P.R., Michel J.P., Bouras C., Giannakopoulos P. (2005) Cognitive consequences of thalamic, basal ganglia and deep white matter lacunes in brain aging and dementia. *Stroke* **36**, 1184-1188.
 206. Bouras C., Riederer B.M., Kövari E., Hof P.R., Giannakopoulos P. (2005) Humoral immunity in brain aging and Alzheimer's disease. *Brain Res. Rev.* **48**, 477-487.

207. von Gunten A., Miklossy J., Suvà M.L., Hof P.R., Giannakopoulos P. (2005) Environmental reduplicative paramnesia in a case of atypical Alzheimer's disease. *NeuroCase* **11**, 216-226.
208. von Gunten A., Kövari E., Rivara C.B., Bouras C., Hof P.R., Giannakopoulos P. (2005) Stereologic analysis of hippocampal Alzheimer disease pathology in the oldest-old: evidence for sparing of the entorhinal cortex and CA1 field. *Exp. Neurol.* **193**, 198-206.
209. Radley J.J., Sisti H.M., Rocher A.B., Hof P.R., McEwen B.S., Morrison J.H. (2005) Reversibility of apical dendritic retraction in the rat medial prefrontal cortex following repeated stress. *Exp. Neurol.* **196**, 199-203.
210. Hakeem A., Hof P.R., Sherwood C.C., Switzer III R.C., Rasmussen L.E.L., Allman J.M. (2005) The brain of the African elephant (*Loxodonta africana*): neuroanatomy from magnetic resonance images. *Anat. Rec.* **287**, 1117-1127.
211. Hof P.R., Chanis R., Marino L. (2005) Cortical complexity in cetacean brains. *Anat. Rec.* **287**, 1142-1152.
212. Hof P.R., Sherwood C.C. (2005) Morphomolecular neuronal phenotypes in the neocortex reflect phylogenetic relationships among certain mammalian orders. *Anat. Rec.* **287**, 1153-1163.
213. Ma Y., Hof P.R., Grant S.C., Blackband S.J., Bennett R., Slates L., McGuigan M.D., Benveniste H. (2005) A three-dimensional atlas database of the adult C57BL6/J mouse brain by magnetic resonance microscopy. *Neuroscience* **135**, 1203-1215.
214. Wen P.H., De Gasperi R., Gama Sosa M.A., Rocher A.B., Friedrich Jr. V.L., Hof P.R., Elder G.A. (2005) Selective expression of presenilin 1 in neural progenitor cells rescues the cerebral hemorrhages and cortical lamination defects found in presenilin 1-null mutant mice. *Development* **132**, 3873-3883.
215. Zhao Z., Ho L., Qin W., Festa E.D., Mobbs C.V., Hof P.R., Rocher A.B., Masur S., Haroutunian V., Pasinetti G.M. (2005) Connective tissue growth factor (CTGF) expression in the brain is a downstream effector of insulin resistance-associated promotion of Alzheimer's disease β-amyloid neuropathology. *FASEB J.* **19**, 2081-2082; full text version (18 pp.) available at <http://www.fasebj.org/cgi/doi:10.1096/fj.05-4359fje>.
216. Wearne S.L., Rodriguez A., Ehlenberger D.B., Rocher A.B., Henderson S.C., Hof P.R. (2005) New techniques for imaging, digitization, and analysis of three-dimensional neuronal morphology on multiple scales. *Neuroscience* **136**, 661-680.
217. von Gunten A., Kövari E., Bussière T., Rivara C.B., Gold G., Bouras C., Hof P.R., Giannakopoulos P. (2006) Cognitive impact of neuronal pathology in the entorhinal cortex and CA1 field in Alzheimer's disease. *Neurobiol. Aging* **27**, 270-277.
218. Rothnie P., Kabaso D., Henry B.I., Hof P.R., Wearne S.L. (2006) Functionally relevant measures of spatial complexity in neuronal dendritic arbors. *J. Theor. Biol.* **238**, 505-526.
219. Radley J.J., Rocher A.B., Miller M., Janssen W.G.M., Liston C., Hof P.R., McEwen B.S., Morrison J.H. (2006) Repeated stress induces dendritic spine loss in the rat medial prefrontal cortex. *Cereb. Cortex* **16**, 313-320.

220. Hao J., Rapp P.R., Leffler A.E., Leffler S.R., Janssen W.G.M., Lou W., McKay H., Roberts J.A., Wearne S.L., Hof P.R., Morrison J.H. (2006) Estrogen alters spine number and morphology in prefrontal cortex of aged female rhesus monkeys. *J. Neurosci.* **26**, 2571-2578.
221. Bouras C., Kövari E., Herrmann F.R., Rivara C.B., Bailey T.L., von Gunten A., Hof P.R., Giannakopoulos P. (2006) Stereologic analysis of microvascular morphology in the elderly: Alzheimer disease pathology and cognitive status. *J. Neuropathol. Exp. Neurol.* **65**, 235-244.
222. Vereczki V., Martin E., Rosenthal R.E., Hof P.R., Hoffman G.E., Fiskum G. (2006) Normoxic resuscitation after cardiac arrest protects against hippocampal oxidative stress, metabolic dysfunction, and neuronal death. *J. Cereb. Blood Flow Metab.* **26**, 821-835.
223. von Gunten A., Bouras C., Kövari E., Giannakopoulos P., Hof P.R. (2006) Neural substrates of cognitive and behavioral deficits in atypical Alzheimer's disease. *Brain Res. Rev.* **51**, 176-211.
224. Van der Gucht E., Youakim M., Arckens L., Hof P.R., Baizer J.S. (2006) Variations in the structure of the prelunate gyrus in Old World monkeys. *Anat. Rec.* **288**, 753-775.
225. Liston C., Miller M.M., Goldwater D.S., Radley J.J., Rocher A.B., Hof P.R., Morrison J.H., McEwen B.S. (2006) Stress-related alterations in frontal cortical dendritic morphology predict selective impairments in perceptual attentional set-shifting. *J. Neurosci.* **26**, 7870-7874.
226. Blanco-Centurion C., Xu M., Murillo-Rodriguez E., Gerashchenko D., Shiromani A.M., Salin-Pascual R.J., Hof P.R., Shiromani P.J. (2006) Adenosine and sleep homeostasis in the basal forebrain. *J. Neurosci.* **26**, 8092-8100.
227. Coplan J.D., Mathew S.J., Mao X., Smith E.L.P., Hof P.R., Coplan P.M., Rosenblum L.A., Gorman J.M., Shungu D.C. (2006) Decreased choline and creatine concentrations in centrum semiovale in patients with generalized anxiety disorder: relationship to IQ and early trauma. *Psychiatry Res. Neuroimaging* **147**, 27-39.
228. Radley J.J., Johnson L.R., Janssen W.G.M., Martino J., Lamprecht R., Hof P.R., LeDoux J.E., Morrison J.H. (2006) Associative Pavlovian conditioning leads to an increase in spinophilin-immunoreactive dendritic spines in the lateral amygdala. *Eur. J. Neurosci.* **24**, 876-884.
229. Casanova M.F., van Kooten I.A.J., Switala A.E., van Engeland H., Heinsen H., Steinbusch H.M.W., Hof P.R., Trippe J., Stone J., Schmitz C. (2006) Minicolumnar abnormalities in autism. *Acta Neuropathol.* **112**, 287-303.
230. Rodriguez A., Ehlenberger D.B., Hof P.R., Wearne S.L. (2006) Rayburst sampling, an algorithm for automated three-dimensional shape analysis from laser scanning microscopy images. *Nat. Protoc.* **1**, 2152-2161.
231. Buchsbaum M.S., Friedman J., Buchsbaum B.R., Chu K.W., Hazlett E.A., Newmark R., Schneiderman J.S., Torosjan Y., Tang C., Hof P.R., Stewart D., Davis K.L., Gorman J. (2006) Diffusion tensor imaging in schizophrenia. *Biol. Psychiatry* **60**, 1181-1187.

232. Sherwood C.C., Stimpson C.D., Raghanti M.A., Wildman D.E., Uddin M., Grossman L.I., Goodman M., Redmond J.C., Bonar C., Erwin J.M., Hof P.R. (2006) Evolution of increased glial cell density in the human frontal cortex. *Proc. Natl. Acad. Sci. USA* **103**, 13606-13611.\
233. Sherwood C.C., Raghanti M.A., Stimpson C.D., Bonar C.J., de Sousa A.A., Preuss T.M., Hof P.R. (2007) Scaling of inhibitory microcircuitry in areas V1 and V2 of anthropoid primates revealed by calcium-binding protein immunohistochemistry. *Brain Behav. Evol.* **69**, 176-195.
234. Giannakopoulos P., Gold G., Kövari E., Imhof A., Bouras C., Hof P.R. (2007) Assessing the cognitive impact of Alzheimer disease pathology and vascular burden in the aging brain. *Acta Neuropathol.* **113**, 1-12.
235. Hof P.R., Van der Gucht E. (2007) The structure of the cerebral cortex of the humpback whale, *Megaptera novaeangliae* (Cetacea, Mysticeti, Balaenopteridae). *Anat. Rec.* **290**, 1-31.
236. Bachetta J.P., Kövari E., Merlo M., Canuto A., Herrmann F.R., Hof P.R., Bouras C., Gold G., Giannakopoulos P. (2007) Neuropathological validation of clinical criteria for possible vascular dementia in the oldest-old. *Neurobiol. Aging* **28**, 579-585.
237. Radley J.J., Farb C.R., He Y., Janssen W.G., Rodrigues S.M., Johnson L.R., Hof P.R., LeDoux J.E., Morrison J.H. (2007) Distribution of NMDA and AMPA receptor subunits at thalamo-amygdaloid dendritic spines. *Brain Res.* **1134**, 87-94.
238. Kövari E., Gold G., Herrmann F.R., Canuto A., Hof P.R., Bouras C., Giannakopoulos P. (2007) Cortical microinfarcts and demyelination affect cognition in cases at high risk for dementia. *Neurology* **68**, 927-931.
239. Franciosi S., De Gasperi R., Dickstein D.L., English D.F., Rocher A.B., Janssen W.G.M., Christoffel D., Gama Sosa M.A., Hof P.R., Buxbaum J.D., Elder G.A. (2007) Pepsin pretreatment allows collagen IV immunostaining of blood vessels in adult mouse brain. *J. Neurosci. Methods* **63**, 76-82.
240. Marino L., Connor R.C., Fordyce R.E., Herman L.M., Hof P.R., Lefèvre L., Lusseau D., McCowan B., Nimchinsky E.A., Pack A.A., Rendell L., Reidenberg J.S., Reiss D., Uhen M.D., Van der Gucht E., Whitehead H. (2007) Cetacean intelligence: large complex brains for complex cognition. *PLoS Biol.* **5**, e139, 0966-0972; doi: 10.1371/journal.pbio.0050139.
241. Kreczmanski P., Heinzen H., Mantua V., Woltersdorf F., Masson T., Ulfhake N., Schmidt-Kastner R., Korr H., Steinbusch H.W.M., Hof P.R., Schmitz C. (2007) Volume, neuron density and total neuron number in five subcortical regions in schizophrenia. *Brain* **130**, 678-692.
242. Giannakopoulos P., von Gunten A., Kövari E., Gold G., Herrmann F.R., Hof P.R., Bouras C. (2007) Stereological analysis of neuropil threads in the hippocampal formation: relationships with Alzheimer's disease neuronal pathology and cognition. *Neuropathol. Appl. Neurobiol.* **33**, 334-343.

243. Dickstein D.L., Kabaso D., Rocher A.B., Luebke J.I., Wearne S.L., Hof P.R. (2007) Changes in the structural complexity of the aged brain. *Aging Cell* **6**, 275-284.
244. Sherwood C.C., Wahl E., Erwin J.M., Hof P.R., Hopkins W.D. (2007) Histological asymmetries of primary motor cortex predict handedness in chimpanzees (*Pan troglodytes*). *J. Comp. Neurol.* **503**, 525-537.
245. Schneiderman J.S., Buchsbaum M.S., Haznedar M.M., Hazlett E.A., Brickman A.M., Shihabuddin L., Brand J.G., Torosjan Y., Newmark R., Tang C., Aronowitz J., Paul-Odouard R., Byne W., Hof P.R. (2007) Age and diffusion tensor anisotropy in adolescent and adult patients with schizophrenia. *Neuropsychobiology* **55**, 96-111.
246. Buchsbaum M.S., Buchsbaum B.R., Hazlett E.A., Haznedar M.M., Newmark R., Tang C.Y., Hof P.R. (2007) Relative glucose metabolic rate is higher in white matter in patients with schizophrenia. *Am. J. Psychiatry* **164**, 1072-1081.
247. Tang C.Y., Friedman J.I., Shungu D.C., Chang L., Ernst T., Steward D., Hajianpour A., Carpenter D., Ng J., Mao X., Hof P.R., Buchsbaum M.S., Davis K.L., Gorman J.M. (2007) Correlations between diffusion tensor imaging (DTI) and magnetic resonance spectroscopy (¹H MRS) in schizophrenic patients and normal controls. *BMC Psychiatry* **7**, 25 (11 pp.).
248. Mus E., Hof P.R., Tiedge H. (2007) Dendritic BC200 RNA in aging and in Alzheimer's disease. *Proc. Natl. Acad. Sci. USA* **104**, 10679-10684.
249. Hao J., Rapp P.R., Janssen W.G.M., Lou W., Lasley B.L., Hof P.R., Morrison J.H. (2007) Interactive effects of age and estrogen on cognition and pyramidal neurons in monkey prefrontal cortex. *Proc. Natl. Acad. Sci. USA* **104**, 11465-11470.
250. Hamzei-Sichani F., Kamasawa N., Janssen W.G.M., Yasumura T., Davidson K.G.V., Hof P.R., Wearne S.L., Stewart M.G., Young S.R., Whittington M.A., Rash J.E., Traub R.D. (2007) Gap junctions on hippocampal mossy fiber axons demonstrated by thin-section electron microscopy and freeze-fracture replica immunogold labeling. *Proc. Natl. Acad. Sci. USA* **104**, 12548-12553.
251. Gama Sosa M.A., De Gasperi R., Rocher A.B., Perez G.M., Simons K., Cruz D.E., Hof P.R., Elder G.A. (2007) Interactions of primary neuroepithelial and brain endothelial cells: distinct effect on neural progenitor maintenance and differentiation by soluble factors and direct contact. *Cell Res.* **17**, 619-626.
252. Van der Gucht E., Hof P.R., Van Brussel L., Burnat K., Arckens L. (2007) Neurofilament protein and neuronal activity markers define regional architectonic parcellation in the mouse visual cortex. *Cereb. Cortex* **17**, 2805-2819.
253. Raghani M.A., Stimpson C.D., Marcinkiewicz J.L., Erwin J.M., Hof P.R., Sherwood C.C. (2008) Differences in cortical serotonergic innervation among humans, chimpanzees and macaque monkeys: a comparative study. *Cereb. Cortex* **18**, 584-597.
254. Fan J., Hof P.R., Guise K., Fossella J.A., Posner M.I. (2008) The functional integration of the anterior cingulate cortex during conflict processing. *Cereb. Cortex* **18**, 796-805.

255. Raghanti M.A., Stimpson C.D., Marcinkiewicz J.L., Erwin J.M., Hof P.R., Sherwood C.C. (2008) Cortical cholinergic innervation of the frontal cortex: differences among humans, chimpanzees, and macaque monkeys. *J. Comp. Neurol.* **506**, 409-424.
256. Radley J.J., Rocher A.B., Rodriguez A., Ehlenberger D.B., Dammann M., McEwen B.S., Morrison J.H., Wearne S.L., Hof P.R. (2008) Repeated stress alters dendritic spine morphology in the rat medial prefrontal cortex. *J. Comp. Neurol.* **507**, 1141-1150.
257. Uddin M., Opazo J.C., Wildman D.E., Sherwood C.C., Hof P.R., Goodman M., Grossman L.I. (2008) Molecular evolution of the cytochrome c oxidase subunit 5A gene in primates. *BMC Evol. Biol.* **8**, 8, 12 pp.
258. Simic G., Mladinov M., Sesu Simic D., Jovanov Milosevic N., Islam A., Pajtak A., Barisic N., Sertic J., Lucassen P.J., Hof P.R., Kruslin B. (2008) Abnormal motoneuron migration, differentiation and axon outgrowth in spinal muscular atrophy. *Acta Neuropathol.* **115**, 313-326.
259. van Kooten I.A.J., Palmen S.J.M.C., von Cappeln P., Steinbusch H.W.M., Korr H., Heinsen H., Hof P.R., van Engeland H., Schmitz C. (2008) Neurons in the fusiform gyrus are fewer and smaller in autism. *Brain* **131**, 987-999.
260. Wang S.S.H., Shultz J.R., Burish M.J., Harrison K.H., Hof P.R., Towns L.C., Wagers M.W., Wyatt K.D. (2008) Shaping of white matter composition by biophysical scaling constraints. *J. Neurosci.* **28**, 4056-4047.
261. Gannon P.J., Kheck-Gannon N., Hof P.R. (2008) Leftward interhemispheric asymmetry of macaque monkey temporal lobe language area homolog is evident at the cytoarchitectural, but not gross anatomic, level. *Brain Res.* **1199**, 62-73.
262. Yague J.G., Wang A.C.J., Janssen W.G.M., Hof P.R., Garcia-Segura L.M., Azcoitia I., Morrison J.H. (2008) Aromatase distribution in the monkey temporal cortex and hippocampus. *Brain Res.* **1209**, 115-127.
263. Agashiwala R.M., Louis E.D., Hof P.R., Perl D.P. (2008) A novel approach to non-biased systematic-random sampling: a stereologic estimate of Purkinje cells in the human cerebellum. *Brain Res.* **1236**, 73-78.
264. Tommasini S.M., Wearne S.L., Hof P.R., Jepsen K.J. (2008) Percolation theory relates corticocancellous architecture to mechanical function in vertebrae of inbred mouse strains. *Bone* **42**, 743-750.
265. Rodriguez A., Ehlenberger D.B., Dickstein D.L., Hof P.R., Wearne S.L. (2008) Automated three-dimensional detection and classification of dendritic spines from fluorescence microscopy. *PLoS One* **3(4)**, e1997, 12 pp., doi:10.1371/journal.pone.0001997.
266. Ma Y., Smith D., Hof P.R., Foerster B., Hamilton S., Blackband S.J., Yu M., Benveniste H. (2008) *In vivo* 3D digital atlas database of the adult C57BL/6J mouse brain by magnetic resonance microscopy. *Front. Neuroanat.* **2(1)**, 10 pp., doi:10.3389/neuro.05.001.2008.
267. Navailles S., Hof P.R., Schmauss C. (2008) Antidepressant drug-induced stimulation of mouse hippocampal neurogenesis is age-dependent. *J. Comp. Neurol.* **509**, 372-381.

268. De Gasperi R., Rocher A.B., Gama Sosa M.A., Wearne S.L., Perez G.M., Friedrich Jr. V.L., Hof P.R., Elder G.A. (2008) The IRG mouse: a two-color fluorescent reporter for assessing Cre-mediated recombination and imaging three-dimensional cellular relationships *in situ*. *Genesis* **46**, 308-317.
269. Brasnjevic I., Hof P.R., Steinbusch H.W.M., Schmitz C. (2008) Accumulation of nuclear DNA damage or neuron loss: molecular basis for a new approach to understanding selective neuronal vulnerability in neurodegenerative diseases. *DNA Repair* **7**, 1087-1097.
270. Raghanti M.A., Stimpson C.D., Marcinkiewicz J.L., Erwin J.M., Hof P.R., Sherwood C.C. (2008) Differences in cortical dopaminergic innervation among humans, chimpanzees, and macaque monkeys: a comparative study. *Neuroscience* **155**, 203-220.
271. Vogt B.A., Hof P.R., Friedman D.P., Sikes R.W., Vogt L.J. (2008) Norepinephrinergic afferents and cytology of the macaque monkey midline and intralaminar thalamic nuclei. *Brain Struct. Funct.* **212**, 465-479.
272. Friedman J.I., Tang C., Carpenter D., Buchsbaum M., Schmeidler J., Flanagan L., Golembo S., Kanellopoulou I., Ng J., Hof P.R., Harvey P.D., Tsopelas N.D., Stewart D., Davis K.L. (2008) Diffusion tensor imaging findings in first-episode and chronic schizophrenia patients. *Am. J. Psychiatry* **165**, 1024-1032.
273. Carpenter D.M., Tang C.Y., Friedman J.I., Hof P.R., Stewart D.G., Buchsbaum M.S., Harvey P.D., Gorman J.M., Davis K.L. (2008) Temporal characteristics of tract-specific anisotropy abnormalities in schizophrenia. *NeuroReport* **19**, 1369-1372.
274. Marino L., Butti C., Connor R.C., Fordyce R.E., Herman L.M., Hof P.R., Lefèvre L., Lusseau D., McCowan B., Nimchinsky E.A., Pack A.A., Reidenberg J.S., Reiss D., Rendell L., Uhen M.D., Van der Gucht E., Whitehead H. (2008) A claim in search of evidence: reply to Manger's thermogenesis hypothesis of cetacean brain structure. *Biol. Rev.* **83**, 417-440.
275. Kaufman J.A., Paul L.K., Manaye K.F., Granstedt A.E., Hof P.R., Hakeem A.Y., Allman J.M. (2008) Selective reduction of Von Economo neuron number in agenesis of the corpus callosum. *Acta Neuropathol.* **116**, 479-489.
276. Akram A., Christoffel D., Rocher A.B., Bouras C., Kövari E., Perl D.P., Morrison J.H., Herrmann F.R., Haroutunian V., Giannakopoulos P., Hof P.R. (2008) Stereologic estimates of total spinophilin-immunoreactive spine numbers in area 9 and the CA1 field: relationship with the progression of Alzheimer's disease. *Neurobiol. Aging* **29**, 1296-1307.
277. Brennan A.R., Yuan P., Dickstein D.L., Rocher A.B., Hof P.R., Manji H., Arnsten A.F.T. (2009) Protein kinase C activity is associated with prefrontal cortical decline in aging. *Neurobiol. Aging* **30**, 782-792.
278. Sherwood C.C., Stimpson C.D., Butti C., Bonar C.J., Newton A.L., Allman J.M., Hof P.R. (2009) Neocortical neuron types in Xenarthra and Afrotheria: implications for brain evolution in mammals. *Brain Struct. Funct.* **213**, 301-328.

279. Hakeem A.Y., Sherwood C.C., Bonar C.J., Butti C., Hof P.R., Allman J.M. (2009) Von Economo neurons in the elephant brain. *Anat. Rec.* **292**, 242-248.
280. Raghanti M.A., Spoerter M.A., Stimpson C.D., Erwin J.M., Bonar C.J., Allman J.H., Hof P.R., Sherwood C.C. (2009) Species-specific distribution of tyrosine hydroxylase-immunoreactive neurons in the prefrontal cortex of anthropoid primates. *Neuroscience* **158**, 1551-1559.
281. Schneiderman J.S., Buchsbaum M.S., Haznedar M.M., Hazlett E.A., Brickman A.M., Shihabuddin L., Brand J.G., Torosjan Y., Newmark R.E., Canfield E.L., Tang C., Aronowitz J., Paul-Odouard R., Hof P.R. (2009) Age and diffusion tensor anisotropy in adolescent and adult patients with schizophrenia. *NeuroImage* **45**, 662-671.
282. Segal D., Schmitz C., Hof P.R. (2009) Spatial distribution and density of oligodendrocytes in the cingulum bundle are unaltered in schizophrenia. *Acta Neuropathol.* **117**, 385-394.
283. Kreczmanski P., Heinsen H., Mantua V., Woltersdorf F., Masson T., Ulfhake N., Schmidt-Kastner R., Korr H., Steinbusch H.W.M., Hof P.R., Schmitz C. (2009) Microvessel length density, total length, and length per neuron in five subcortical brain regions in schizophrenia. *Acta Neuropathol.* **117**, 409-421.
284. Giannakopoulos P., Kövari E., Herrmann F.R., Hof P.R., Bouras C. (2009) Interhemispheric distribution of Alzheimer disease and vascular pathology in brain aging. *Stroke* **40**, 983-986.
285. Butti C., Sherwood C.C., Hakeem A.Y., Allman J.M., Hof P.R. (2009) Total number and volume of von Economo neurons in the cerebral cortex of cetaceans. *J. Comp. Neurol.* **515**, 243-259.
286. Åslund A., Sigurdson C.J., Klingstedt T., Grathwohl S., Bolmont T., Dickstein D.L., Glimsdal E., Prokop S., Lindgren M., Konradsson P., Holtzman D.M., Hof P.R., Heppner F.L., Gandy S., Jucker M., Aguzzi A., Hammarström P., Nilsson K.P.R. (2009) Novel pentameric thiophene derivatives for *in vitro* and *in vivo* optical imaging of a plethora of protein aggregates in cerebral amyloidoses. *ACS Chem. Biol.* **4**, 673-684.
287. Kabaso D., Coskren P.J., Henry B.I., Hof P.R., Wearne S.L. (2009) The electrotonic structure of pyramidal neurons contributing to prefrontal cortical circuits in macaque monkeys is significantly altered in aging. *Cereb. Cortex* **19**, 2248-2268.
288. Shansky R.M., Hamo C., Hof P.R., McEwen B.S., Morrison J.H. (2009) Stress-induced dendritic remodeling in the prefrontal cortex is circuit-specific. *Cereb. Cortex* **19**, 2479-2484.
289. Rodriguez A., Ehlenberger D.B., Hof P.R., Wearne S.L. (2009) Three-dimensional neuron tracing by voxel scooping. *J. Neurosci. Methods* **184**, 169-175.
290. Pedrini S., Thomas C., Brautigam H., Schmeidler J., Ho L., Fraser P., Westaway D., St. George Hyslop P., Martins R.N., Buxbaum J.D., Pasinetti G.M., Dickstein D.L., Hof P.R., Ehrlich M.E., Gandy S. (2009) Dietary composition modulates brain mass and solubilizable A β levels in a mouse model of aggressive Alzheimer's amyloid pathology. *Mol. Neurodegen.* **4**, 40, 10 pp.

291. Franciosi S., Gama Sosa M.A., English D., Oler E., Oung T., Janssen W.G.M., Perez G.M., De Gasperi R., Dickstein D.L., Schmitz C., Hof P.R., Buxbaum J.D., Elder G.A. (2009) Systemic hypercholesterolemia leads to a novel cerebrovascular pathology in mice lacking the low-density lipoprotein receptor. *Mol. Neurodegen.* **4**, 42, 12 pp.
292. Höistad M., Segal D., Takahashi N., Sakurai T., Buxbaum J.D., Hof P.R. (2009) Linking white and grey matter in schizophrenia: oligodendrocyte and neuron pathology in the prefrontal cortex. *Front. Neuroanat.* **3**, 9, 16 pp.
293. Caminiti R., Ghazari H., Galuske R., Hof P.R., Innocenti G.M. (2009) Evolution amplified processing with temporally-dispersed, slow neuronal connectivity in primates. *Proc. Natl. Acad. Sci. USA* **106**, 19551-19556.
294. Goodman M., Sterner K.N., Islam M., Uddin M., Sherwood C.C., Hof P.R., Hou Z.C., Lipovich L., Jia H., Grossman L.I., Wildman D.E. (2009) Phylogenomic analyses reveal convergent patterns of adaptive evolution in elephant and human ancestries. *Proc. Natl. Acad. Sci. USA* **106**, 20824-20829.
295. Santos M., Kövari E., Hof P.R., Bouras C., Giannakopoulos P. (2009) The impact of vascular burden on late-life depression. *Brain Res. Rev.* **62**, 19-32.
296. Goldwater D.S., Pavlides C., Hunter R.C., Bloss E.B., Hof P.R., McEwen B.S., Morrison J.H. (2009) Structural and functional alterations to rat medial prefrontal cortex following chronic restraint stress and recovery. *Neuroscience* **164**, 798-808.
297. Gama Sosa M.A., De Gasperi R., Rocher A.B., Wang A.C.J., Janssen W.G.M., Flores T., Perez G.M., Schmeidler J., Dickstein D.L., Hof P.R., Elder G.A. (2010) Age-related vascular pathology in transgenic mice expressing presenilin 1-associated familial Alzheimer's disease mutations. *Am. J. Pathol.* **176**, 353-368.
298. Sharma Y., Xu T., Graf W.M., Fobbs A., Sherwood C.C., Hof P.R., Allman J.M., Manaye K.F. (2010) Comparative anatomy of the locus coeruleus in humans and nonhuman primates. *J. Comp. Neurol.* **518**, 963-971.
299. Raghani M.A., Spoerl M.A., Butti C., Hof P.R., Sherwood C.C. (2010) A comparative perspective on minicolumns and inhibitory GABAergic interneurons in the neocortex. *Front. Neuroanat.* **3**, 35, 10 pp.
300. Sherwood C.C., Raghani M.A., Stimpson C.D., Spoerl M.A., Uddin M., Boddy A.M., Wildman D.E., Bonar C.J., Lewandowski A.H., Phillips K.A., Erwin J.M., Hof P.R. (2010) Inhibitory interneurons of the human prefrontal cortex display conserved evolution of the phenotype and related genes. *Proc. R. Soc. B* **277**, 1011-1020.
301. Spoerl M.A., Hopkins W.D., Garrison A.R., Bauernfeind A.L., Stimpson C.D., Hof P.R., Sherwood C.C. (2010) Wernicke's homologue (area Tpt) in chimpanzees (*Pan troglodytes*) and its relation to the appearance of modern human language. *Proc. R. Soc. B* **277**, 2165-2174.
302. Schenker N.M., Hopkins W.D., Spoerl M.A., Garrison A.R., Stimpson C.D., Erwin J.M., Hof P.R., Sherwood C.C. (2010) Broca's area homologue in chimpanzees (*Pan troglodytes*): probabilistic mapping, asymmetry, and comparison to humans. *Cereb. Cortex* **20**, 730-742.

303. De Sousa A.A., Sherwood C.C., Schleicher A., Amunts K., MacLeod C.E., Hof P.R., Zilles K. (2010) Comparative cytoarchitectural analyses of striate and extrastriate areas in hominoids. *Cereb. Cortex* **20**, 966-981.
304. Gu X., Liu X., Guise K.G., Naidich T.P., Hof P.R., Fan J. (2010) Functional dissociation of the frontoinsular and anterior cingulate cortices in empathy for pain. *J. Neurosci.* **30**, 3739-3744.
305. Segal D., Haznedar M.M., Hazlett E., Entis J.J., Newmark R.E., Torosjan Y., Schneiderman J.S., Friedman J.I., Chu K.W., Tang C.Y., Buchsbaum M.S., Hof P.R. (2010) Diffusion tensor anisotropy in the cingulate gyrus in schizophrenia. *NeuroImage* **50**, 357-365.
306. Akram A., Schmeidler J., Katsel P., Hof P.R., Haroutunian V. (2010) Increased expression of cholesterol transporter ABCA1 is highly correlated with severity of dementia in Alzheimer's disease hippocampus. *Brain Res.* **1318**, 167-177.
307. Boban M., Sarac H., Mimica N., Mladinov M., Süßmair C., Ackl N., Bader B., Huzak M., Danek A., Hof P.R., Simic G. (2010) CSF tau proteins in differential diagnosis of dementia. *Translat. Neurosci.* **1**, 43-48.
308. Elder G.A., Gama Sosa M.A., De Gasperi R., Dickstein D.L., Hof P.R. (2010) Presenilin transgenic mice as models of Alzheimer's disease. *Brain Struct. Funct.* **214**, 127-143.
309. Takahashi H., Brasnjovic I., Rutten B.P.F., van der Kolk N., Perl D.P., Bouras C., Steinbusch H.W.M., Schmitz C., Hof P.R., Dickstein D.L. (2010) Hippocampal interneuron loss in an APP/PS1 double mutant mouse and in Alzheimer's disease. *Brain Struct. Funct.* **214**, 145-160.
310. Dickstein D.L., Brautigam H., Stockton Jr. S.D., Schmeidler J., Hof P.R. (2010) Changes in dendritic complexity and spine morphology in transgenic mice expressing human wild-type tau. *Brain Struct. Funct.* **214**, 161-179.
311. Luebke J.I., Weaver C., Rocher A.B., Rodriguez A., Crimins J.L., Dickstein D.L., Wearne S.L., Hof P.R. (2010) Dendritic vulnerability in neurodegenerative disease: insights from analyses of cortical pyramidal neurons in transgenic mouse models. *Brain Struct. Funct.* **214**, 181-199.
312. Abdallah C.G., Tang C.Y., Mathew S.J., Martinez J., Hof P.R., Perera T.D., Shungu D.C., Gorman J.M., Coplan J.D. (2010) Diffusion tensor imaging in studying white matter complexity: a gap junction hypothesis. *Neurosci. Lett.* **475**, 161-164.
313. Sakurai T., Ramoz N., Barreto M., Gazdoiu M., Takahashi N., Gertner M., Dorr N., Gama Sosa M.A., De Gasperi R., Perez G., Schmeidler J., Mitropoulou V., Le H.C., Lupu M., Hof P.R., Elder G.A., Buxbaum J.D. (2010) *Slc25a12* disruption alters myelination and neurofilaments: a model for a hypomyelination syndrome and childhood neurodevelopmental disorders. *Biol. Psychiatry* **67**, 887-894.
314. Sherwood C.C., Duka T., Stimpson C.D., Schenker N.M., Garrison A.R., Schapiro S.J., Baze W.D., McArthur M.J., Erwin J.M., Hof P.R., Hopkins W.D. (2010) Neocortical

- synaptophysin asymmetry and behavioral lateralization in chimpanzees (*Pan troglodytes*). *Eur. J. Neurosci.* **31**, 1456-1464.
315. De Sousa A.A., Sherwood C.C., Mohlberg H., Amunts K., Schleicher A., MacLeod C., Hof P.R., Frahm H., Zilles K. (2010) Hominoid visual brain structure volumes and the position of the lunate sulcus. *J. Hum. Evol.* **58**, 281-292.
316. Butti C., Hof P.R. (2010) The insular cortex: a comparative perspective. *Brain Struct. Funct.* **214**, 477-493.
317. Allman J.M., Tetreault N.A., Hakeem A.Y., Manaye K.F., Semendeferi K., Erwin J.M., Goubert V., Hof P.R. (2010) The von Economo neurons in frontoinsular and anterior cingulate cortex in great apes and humans. *Brain Struct. Funct.* **214**, 495-517.
318. Segal D., Carpenter D., Höistad M., Haroutunian V., Tang C.Y., Hof P.R. (2010) Cingulum bundle white matter in MAG-knockout mice. *Transl. Neurosci.* **1**, 131-138.
319. Coplan J.D., Abdallah C.G., Tang C.Y., Mathew S.J., Martinez J., Hof P.R., Smith E.L.P., Dwork A.J., Perera T.D., Pantol G., Carpenter D., Rosenblum L.A., Shungu D.C., Gelernter J., Kaffman A., Jackowski A., Kaufman J., Gorman J.M. (2010) The role of early life stress in development of the anterior limb of the internal capsule in non-human primates. *Neurosci. Lett.* **480**, 93-96.
320. Coplan J.D., Mathew S.J., Abdallah C.G., Mao X., Kral J.G., Smith E.L., Rosenblum L.A., Perera T.D., Dwork A.J., Hof P.R., Gorman J.M., Shungu D.C. (2010) Early-life stress and neurometabolites of the hippocampus. *Brain Res.* **1358**, 191-199.
321. Shamy J.L., Carpenter D.M., Fong S.G., Murray E.A., Tang C.Y., Hof P.R., Rapp P.R. (2010) Alterations of white matter tracts following neurotoxic hippocampal lesions in macaque monkeys: a diffusion tensor imaging study. *Hippocampus* **20**, 906-910.
322. Akram A., Schmeidler J., Katsel P., Hof P.R., Haroutunian V. (2010) Increased expression of *RXRα* in dementia: an early harbinger for the cholesterol dyshomeostasis? *Mol. Neurodegen.* **5**, 36.
323. Shansky R.M., Hamo C., Hof P.R., McEwen B.S., Morrison J.H. (2010) Estrogen promotes stress sensitivity in a prefrontal cortex-amygdala pathway. *Cereb. Cortex* **20**, 2560-2567.
324. Mladinov M., Mayer D., Brcic L., Wolstencroft E., thi Man N., Holt I., Hof P.R., Morris G.E., Simic G. (2010) Astrocyte expression of D2-like dopamine receptors in the prefrontal cortex. *Translat. Neurosci.* **1**, 238-243.
325. Santos M., Gold G., Kövari E., Herrmann F.R., Hof P.R., Bouras C., Giannakopoulos P. (2010) Neuropathologic analysis of lacunes and microvascular lesions in late-onset depression. *Neuropathol. Appl. Neurobiol.* **36**, 661-672.
326. Sinka L., Kövari E., Gold G., Hof P.R., Herrmann, F.R., Bouras C., Giannakopoulos P. (2010) Small vascular and Alzheimer disease-related pathologic determinants of dementia in the oldest-old. *J. Neuropathol. Exp. Neurol.* **69**, 1247-1255.

327. Innocenti G.M., Caminiti R., Hof P.R. (2010) Fiber composition in the *planum temporale* sector of the corpus callosum in chimpanzee and human. *Brain Struct. Funct.* **215**, 123-128.
328. De Gasperi R., Zoltewicz J.S., Gama Sosa M.A., Haroutunian V., Hof P.R., Notterpek L., Davis K.L., Buxbaum J.D., Elder G.A. (2010) Peripheral myelin protein 22 is expressed in CNS myelin. *Translat. Neurosci.* **1**, 282-285.
329. Schwartz E., Wicinski B., Schmeidler J., Haroutunian V., Hof P.R. (2010) Cardiovascular risk factors affects hippocampal microvasculature in early Alzheimer's disease. *Transl. Neurosci.* **1**, 292-299.
330. Bozdagi O., Sakurai T., Papapetrou D., Wang X., Dickstein D.L., Scattoni M.L., Takahashi N., Kajiwara Y., Harris M.J., Saxena R., Katz A.M., Silverman J.L., Yang M., Krug L., Zhou Q., Crawley J.N., Hof P.R., Buxbaum J.D. (2010) *Shank3* haploinsufficiency leads to altered synaptic development, transmission, and plasticity as well as to social deficits. *Mol. Autism* **1**, 15.
331. Stimpson C.D., Tetreault N.A., Allman J.M., Jacobs B., Butti C., Hof P.R., Sherwood C.C. (2011) Biochemical specificity of von Economo neurons in hominoids. *Am. J. Hum. Biol.* **23**, 22-28.
332. Fan J., Gu X., Liu X., Guise K.G., Park Y., Martin L., de Marchena A., Tang C.Y., Minzenberg M.J., Hof P.R. (2011) Involvement of the anterior cingulate and frontoinsular cortices in rapid processing of salient facial emotional information. *NeuroImage* **54**, 2539-2546.
333. Jacobs B., Lubs J., Hannan M., Anderson K., Butti C., Sherwood C.C., Hof P.R., Manger P.R. (2011) Neuronal morphology in the African elephant (*Loxodonta africana*) neocortex. *Brain Struct. Funct.* **215**, 273-298.
334. Bernardi S., Anagnostou E., Shen J., Kolevzon A., Buxbaum J.D., Hollander E., Hof P.R., Fan J. (2011) *In vivo* ¹H-magnetic resonance spectroscopy study of the attentional networks in autism. *Brain Res.* **1380**, 198-205.
335. Santos M., Uppal N., Butti C., Wicinski B., Schmeidler J., Giannakopoulos P., Heinsen H., Schmitz C., Hof P.R. (2011) Von Economo neurons in autism: a stereologic study of the frontoinsular cortex in children. *Brain Res.* **1380**, 206-217.
336. Kern A., Siebert U., Cozzi B., Hof P.R., Oelschläger H.H.A. (2011) Stereology of the neocortex in odontocetes: qualitative, quantitative, and functional implications. *Brain Behav. Evol.* **77**, 79-90.
337. Raghanti M.A., Simic G., Watson S., Stimpson C.D., Hof P.R., Sherwood C.C. (2011) Comparative analysis of the nucleus basalis of Meynert among primates. *Neuroscience* **184**, 1-15.
338. Takahashi N., Sakurai T., Bozdagi O., Dorr N.P., Moy J., Krug L., Gama-Sosa M., Elder G.A., Koch R.J., Walker R.H., Hof P.R., Davis K.L., Buxbaum J.D. (2011) Increased expression of receptor phosphotyrosine phosphatase- β/ζ is associated with molecular, cellular, behavioral, and cognitive schizophrenia phenotypes. *Transl. Psychiatry* **1**, e8.

339. Sarac H., Henigsberg N., Markeljevic J., Pavlisa G., Hof P.R., Simic G. (2011) Fragile-X permutation tremor/ataxia syndrome (FXTAS) in a young woman: clinical, genetics, MRI and ¹H-MR spectroscopy correlates. *Coll. Anthropol.* **35**(Suppl. 1), 327-332.
340. Baizer J.S., Sherwood C.C., Hof P.R., Witelson S.F., Sultan F. (2011) Neurochemical and structural organization of the principal nucleus of the inferior olive in the human. *Anat. Rec.* **294**, 1198-1216.
341. Shamy J.L., Habeck C., Hof P.R., Amaral D.G., Fong S.G., Buonocore M.H., Stern Y., Barnes C.A., Rapp P.R. (2011) Volumetric correlates of spatiotemporal working and recognition memory impairment in aged rhesus monkeys. *Cereb. Cortex* **21**, 1559-1573.
342. Mann S.L., Hazlett E.A., Byne W., Hof P.R., Buchsbaum M.S., Cohen B.H., Goldstein K.E., Haznedar M.M., Mitsis E.M., Siever L.J., Chu K.W. (2011) Anterior and posterior cingulate cortex volume in healthy adults: effects of aging and gender differences. *Brain Res.* **1401**, 18-29.
343. Sherwood C.C., Gordon A.D., Allen J.S., Phillips K.A., Erwin J.M., Hof P.R., Hopkins W.D. (2011) Aging of the cerebral cortex differs between humans and chimpanzees. *Proc. Natl. Acad. Sci. USA* **108**, 13029-13034.
344. Paulussen M., Jacobs S., Van der Gucht E., Hof P.R., Arckens L. (2011) Cytoarchitecture of the mouse neocortex revealed by the low molecular weight neurofilament protein subunit. *Brain Struct. Funct.* **216**, 183-199.
345. Bailey M.E., Wang A.C.J., Hao J., Janssen W.G.M., Hara Y., Dumitriu D., Hof P.R., Morrison J.H. (2011) Interactive effects of age and estrogen on cortical neurons: implications for cognitive aging. *Neuroscience* **191**, 148-158.
346. Costanza A., Weber K., Gandy S., Bouras C., Hof P.R., Giannakopoulos P., Canuto A. (2011) Contact sport-related chronic traumatic encephalopathy in the elderly: clinical expression and structural substrates. *Neuropathol. Appl. Neurobiol.* **37**, 570-584.
347. Grabrucker A.M., Schmeisser M.J., Udvardi P.T., Arons M., Schoen M., Woodling N.S., Andreasson K.I., Hof P.R., Buxbaum J.D., Garner C.C., Boeckers T.M. (2011) Amyloid beta protein-induced zinc sequestration leads to synaptic loss via dysregulation of the postsynaptic ProSAP2/Shank3 scaffold. *Mol. Neurodegen.* **6**, 65.
348. Reilley J.E., Hanson H.H., Fernández-Monreal M., Wearne S.L., Hof P.R., Phillips G.R. (2011) Characterization of MSB synapses in dissociated hippocampal cultures with simultaneous pre- and postsynaptic live microscopy. *PLoS One* **6**, e26478.
349. Sarac H., Hajnsek S., Basic S., Telarovic S., Markeljevic J., Vukic M., Rados M., Bosnjac-Pasic M., Zarkovic K., Hof P.R., Simic G. (2011) Giant cavernoma of the skull and skeletal-extraskelatal angiomyomatosis associated with paraproteinemia. *Transl. Neurosci.* **2**, 265-269.
350. Wang J., Ono K., Dickstein D.L., Arrieta-Cruz I., Zhao W., Qian X., Lamparello A., Subnani R., Ferruzzi M., Pavlides C., Ho L., Hof P.R., Teplow D.B., Pasinetti G.M. (2011) Carvedilol as a potential novel agent for the treatment of Alzheimer's disease. *Neurobiol. Aging* **32**, 2321.e1-e12.

351. Akram A., Schmeidler J., Katsel P., Hof P.R., Haroutunian V. (2012) Association of *ApoE* and *LRP* mRNA levels with dementia and AD neuropathology. *Neurobiol. Aging.* **33**, 628.e1-e14.
352. Seeley W.W., Merckle F.T., Gaus S.E., Craig A.D., Allman J.M., Hof P.R. (2012) Distinctive neurons of the anterior cingulate and frontoinsular cortex: a historical perspective. *Cereb. Cortex* **22**, 245-250.
353. Kim E.J., Sidhu M., Gaus S.E., Huang E.J., Hof P.R., Miller B.J., DeArmond S.J., Seeley W.W. (2012) Selective frontoinsular von Economo neuron and fork cell loss in early behavioral variant frontotemporal dementia. *Cereb. Cortex* **22**, 251-259.
354. Coplan J.D., Hodulik S., Mathew S.J., Mao X., Hof P.R., Gorman J.M., Shungu D.C. (2012) The relationship between intelligence and anxiety: an association with subcortical white matter metabolism. *Front. Evol. Neurosci.* **3**, 8.
355. Midthune B., Tyan S.H., Walsh J.J., Sarsoza F., Eggert S., Hof P.R., Dickstein D.L., Koo E.H. (2012) Deletion of the amyloid precursor-like protein 2 (APLP2) does not affect hippocampal neuron morphology or function. *Mol. Cell. Neurosci.* **49**, 448-455.
356. Buxbaum J.D., Betancur C., Bozdagi O., Dorr N.P., Elder G.A., Hof P.R. (2012) Optimizing the phenotyping of rodent ASD models: enrichment analysis of mouse and human neurobiological phenotypes associated with high-risk autism genes identifies morphological, electrophysiological, neurological, and behavioral features. *Mol. Autism.* **3**, 1.
357. Lewitus E., Sherwood C.C., Hof P.R. (2012) Cellular signatures in the primary visual cortex of phylogeny and placentalation. *Brain Struct. Funct.* **217**, 531-547.
358. Zeng H., Shen E.H., Hohmann J.G., Oh S.W., Bernard A., Royall J.J., Glattfelder K.J., Sunkin S.M., Morris J.A., Guillozet-Bongaarts A.L., Smith K.A., Ebbert A.J., Swanson B., Kuan L., Page D.T., Overly C.C., Lein E.S., Hawrylycz M.J., Hof P.R., Hyde T.M., Kleinman J.E., Jones A.R. (2012) Large-scale cellular-resolution gene profiling in human neocortex reveals species-specific molecular signatures. *Cell* **149**, 483-496.
359. Nelson P.T., Alafuzoff I., Bigio E.H., Bouras C., Braak H., Cairns N.J., Castellani R.J., Crain B.J., Davies P., Del Tredici K., Duyckaerts C., Frosch M.P., Ghetti B., Hof P.R., Hulette C.M., Hyman B.T., Iwatsubo T., Jellinger K.A., Kövari E., Kukull W.A., Leverenz J.B., Love S., Mackenzie I.R., Mann D.M.A., Masliah E., McKee A.C., Montine T.J., Morris J.C., Schneider J.A., Silverberg N., Sonnen J.A., Thal D.R., Trojanowski J.Q., Troncoso J.C., Wisniewski T., Wolijer R.L., Beach T.G. (2012) Correlation of Alzheimer's disease neuropathologic changes with cognitive status: a review of the literature. *J. Neuropathol. Exp. Neurol.* **71**, 362-381.
360. Hamzei-Sichani F., Davidson K.G.V., Yasumura T., Janssen W.G.M., Wearne S.L., Hof P.R., Traub R.D., Gutiérrez R., Ottersen O.P., Rash J.E. (2012) Mixed chemical-electrical synapses in adult rat hippocampus are primarily glutamatergic and coupled by connexin-36. *Front. Neuroanat.* **6**, 13.
361. Hogrebe L., Paiva A.R.C., Jurus E., Christensen C., Bridge M., Dai L., Pfeiffer R., Hof P.R., Roysam B., Korenberg J.R., Tasdizen T. (2012) Serial section registration of axonal

- confocal microscopy datasets for long-range neural circuit reconstruction. *J. Neurosci. Methods* **207**, 200-210.
362. Sterner K.S., Weckle A., Chugani H.T., Tarca A.L., Sherwood C.C., Hof P.R., Kuzawa C.W., Boddy A.M., Abbas A., Raam R.L., Grégoire L., Lipovich L., Grossman L.I., Uddin M., Goodman M., Wildman D.E. (2012) Dynamic gene expression in the human cerebral cortex distinguishes children from adults. *PLoS One* **7**, e37714.
363. Chouliaras L., van den Hove D.L.A., Kenis G., Keitel S., Hof P.R., van Os J., Steinbusch H.W.M., Schmitz C., Rutten B.P.F. (2012) Age-related increase in levels of 5-hydroxymethylcytosine in mouse hippocampus is prevented by caloric restriction. *Curr. Alzheimer Res.* **9**, 536-544.
364. Chouliaras L., van den Hove D.L.A., Kenis G., Keitel S., Hof P.R., van Os J., Steinbusch H.W.M., Schmitz C., Rutten B.P.F. (2012) Prevention of age-related changes in hippocampal levels of 5-methylcytidine by caloric restriction. *Neurobiol. Aging* **33**, 1672-1681.
365. Jacot-Descombes S., Uppal N., Wicinski B., Santos M., Schmeidler J., Giannakopoulos P., Heinsen H., Schmitz C., Hof P.R. (2012) Decreased pyramidal neuron size in Brodmann areas 44 and 45 in patients with autism. *Acta Neuropathol.* **124**, 67-79; Erratum, *Acta Neuropathol.* **124**, 81.
366. Yadav A., Gao Y.Z., Rodriguez A., Dickstein D.L., Wearne S.L., Luebke J.I., Hof P.R., Weaver C.M. (2012) Morphological evidence for spatially clustered spines in apical dendrites of monkey neocortical pyramidal neurons. *J. Comp. Neurol.* **520**, 2888-2902.
367. Spocer M.A., Hopkins W.D., Barks S.K., Bianchi S., Hehmeyer A.E., Anderson S.M., Stimpson C.D., Fobbs A.J., Hof P.R., Sherwood C.C. (2012) Neuropil distribution in the cerebral cortex differs between humans and chimpanzees. *J. Comp. Neurol.* **520**, 2917-2929.
368. Barger N., Stefanacci L., Schumann C.M., Sherwood C.C., Annese J., Allman J.M., Buckwalter J.A., Hof P.R., Semendeferi K. (2012) Neuronal populations in the basolateral nuclei of the amygdala are differentially increased in humans compared with apes: a stereological study. *J. Comp. Neurol.* **520**, 3035-3054.
369. Lewitus E., Hof P.R., Sherwood C.C. (2012) Phylogenetic comparison of neuron and glia densities in the primary visual cortex and hippocampus of carnivores and primates. *Evolution* **66**, 2551-2563.
370. Hawrylycz M.J., Lein E.S., Guillozet-Bongaarts A.L., Shen E.H., Ng L., Miller J.A., van de Lagemaat L.N., Smith K.A., Ebbert A., Riley Z.L., Abajian C., Beckmann C.F., Bernard A., Bertagnolli D., Boe A.F., Cartagena P.M., Chakravarty M.M., Chapin M., Chong J., Dalley R.A., Daly B.D., Dang C., Datta S., Dee N., Dolbeare T.A., Faber V., Feng D., Fowler D.R., Goldy J., Gregor B.W., Haradon Z., Haynor D.R., Hohmann J.G., Horvath S., Howard R.E., Jeromin A., Jochim J.M., Kinnunen M., Lau C., Lazarz E.T., Lee C., Lemon T.A., Li L., Li Y., Morris J.A., Overly C.K., Parker P.D., Parry S.E., Reding M., Royall J.J., Schulkin J., Sequeira P.A., Slaughterbeck C.R., Smith S.C., Sodt A.J., Sunkin S.M., Swanson B.E., Vawter M.P., Williams D., Wohnoutka P., Zielke H.R., Geschwind D.H., Hof P.R., Smith S.M., Koch C., Grant S.G.N., Jones A.R. (2012) An anatomically comprehensive atlas of the adult human brain transcriptome. *Nature* **489**, 391-399.

371. Boban M., Malojcic B., Mimica N., Vukovic S., Zrilic I., Hof P.R., Simic G. (2012) The reliability and validity of Mini-Mental State Examination in an elderly Croatian population. *Dement. Geriatr. Cognit. Disord.* **33**, 385-392.
372. Tyan S.H., Shih A.Y.J., Walsh J.J., Murayama H., Sarsoza F., Ku L., Eggert S., Hof P.R., Koo E.H., Dickstein D.L. (2012) Amyloid precursor protein (APP) regulates synaptic structure and function. *Mol. Cell. Neurosci.* **51**, 43-52.
373. Hopkins W.D., Pilger J.F., Storz R., Ambrose A., Hof P.R., Sherwood C.C. (2012) Planum temporale asymmetries correlate with corpus callosum axon fiber density in chimpanzees (*Pan troglodytes*). *Behav. Brain Res.* **234**, 248-254.
374. Fan J., Xu P., Van Dam N.T., Eilam-Stock T., Gu X., Luo Y., Hof P.R. (2012) Spontaneous brain activity relates to autonomic arousal. *J. Neurosci.* **32**, 11176-11186.
375. Gu X., Gao Z., Wang X., Liu X., Knight R.T., Hof P.R., Fan J. (2012) Anterior insular cortex is necessary for empathetic pain perception. *Brain* **135**, 2726-2735.
376. Fan J., Bernardi S., Van Dam N.T., Anagnostou E., Gu X., Martin L., Park Y., Liu X., Kolevzon A., Soorya L., Grodberg D., Hollander E., Hof P.R. (2012) Functional deficits of the attentional networks in autism. *Brain Behav.* **2**, 647-660.
377. Xekardaki A., Santos M., Hof P., Kövari E., Bouras C., Giannakopoulos P. (2012) Neuropathological substrates and structural changes in late-life depression: the impact of vascular burden. *Acta Neuropathol.* **124**, 453-464.
378. Amatrudo J., Weaver C.M., Crimins J.L., Hof P.R., Rosene D.L., Luebke J.I. (2012) Influence of highly distinctive structural properties on the excitability of pyramidal neurons in monkey visual and prefrontal cortices. *J. Neurosci.* **32**, 13644-13660.
379. Sinka L., Kövari E., Santos M., Herrmann F.R., Gold G., Hof P.R., Bouras C., Giannakopoulos P. (2012) Microvascular changes in late-life schizophrenia and mood disorders: stereological assessment of capillary diameters in anterior cingulate cortex. *Neuropathol. Appl. Neurobiol.* **38**, 696-709.
380. Miller D.J., Duka T., Stimpson C.D., Schapiro S.J., Baze W.B., McArthur M.J., Fobbs A.J., Sousa A.M.M., Sestan N., Wildman D.E., Lipovich L., Kuzawa C.W., Hof P.R., Sherwood C.C. (2012) Evolution of prolonged myelin growth in the cerebral cortex of humans compared to chimpanzees. *Proc. Natl. Acad. Sci. USA* **109**, 16480-16485.
381. Brautigam H., Steele J.W., Westaway D., Fraser P.E., St. George-Hyslop P.H., Gandy S., Hof P.R., Dickstein D.L. (2012) The isotropic fractionator provides evidence for differential loss of hippocampal neurons in two mouse models of Alzheimer's disease. *Mol. Neurodegen.* **7**, 58.
382. Gu X., Liu X., Van Dam N.T., Hof P.R., Fan J. (2013) Cognition-emotion integration in the anterior insular cortex. *Cereb. Cortex* **23**, 20-27.
383. Van Dam N.T., Sano M., Mitsis E.M., Grossman H.T., Gu X., Park Y., Hof P.R., Fan J. (2013) Functional neural correlates of attentional deficits in amnestic mild cognitive impairment. *PLoS One* **8(1)**, e54035.

384. Brasnjевич I., Lardenoije R., Schmitz C., van der Kolk N., Dickstein D.L., Takahashi H., Hof P.R., Steinbusch H.W.M., Rutten B.P.F. (2013) Region-specific neuron and synapse loss in the hippocampus of APP^{SL}/PS1 knock-in mice. *Transl. Neurosci.* **4**, 8-19.
385. Mustapic M., Presecki P., Pivac N., Mimica N., Hof P.R., Simic G., Folgenovic-Smalc V., Muck-Seler D. (2013) Genotype-independent decrease in plasma dopamine beta-hydroxylase activity in Alzheimer's disease. *Prog. Neuropsychopharmacol. Biol. Psychiatry* **44**, 94-99.
386. Baizer J.S., Weinstock N., Witelson S.F., Sherwood C.C., Hof P.R. (2013) The nucleus parapraesubiculum in the human, macaque monkey, and chimpanzee. *Brain Struct. Funct.* **218**, 389-403.
387. Maseko B.C., Jacobs B., Spocer M.A., Sherwood C.C., Hof P.R., Manger P.R. (2013) Qualitative and quantitative aspects of the microanatomy of the African elephant cerebellar cortex. *Brain Behav. Evol.* **81**, 40-55.
388. De Sousa A.A., Sherwood C.C., Hof P.R., Zilles K. (2013) Lamination of the lateral geniculate nucleus of catarrhine primates. *Brain Behav. Evol.* **81**, 93-108.
389. Bauernfeind A.L., de Sousa A.A., Avasthi T., Dobson S.D., Raghanti M.A., Lewandowski A.H., Zilles K., Semendeferi K., Allman J.M., Craig A.D., Hof P.R., Sherwood C.C. (2013) A volumetric comparison of the insular cortex and its subregions in primates. *J. Hum. Evol.* **64**, 263-279.
390. DeFelipe J., López-Cruz P.L., Benavides-Piccione R., Bielza C., Larrañaga P., Anderson S., Burkhalter A., Cauli B., Fairén A., Feldmeyer D., Fishell G., Fitzpatrick D., Freund T.F., González-Burgos G., Hestrin S., Hill S., Hof P.R., Huang J., Jones E.G., Kawaguchi Y., Kisvarday Z., Kubota Y., Lewis D.A., Marín O., Markram H., McBain C.J., Meyer H.S., Monyer H., Nelson S.B., Rockland K., Rossier J., Rubenstein J.L.R., Rudy B., Scanziani M., Shepherd G.M., Sherwood C.C., Staiger J.F., Tamás G., Thomson A., Wang Y., Yuste R., Ascoli G.A. (2013) New insights into the classification and nomenclature of cortical GABAergic interneurons. *Nat. Rev. Neurosci.* **14**, 202-216.
391. Raghanti M.A., Conley T., Sudduth J., Erwin J.M., Stimpson C.D., Hof P.R., Sherwood C.C. (2013) Neuropeptide Y-immunoreactive neurons in the cerebral cortex of humans and other haplorrhine primates. *Am. J. Primatol.* **75**, 415-424.
392. McFarlin S.C., Barks S.K., Tocheri M.W., Massey J.S., Eriksen A.B., Fawcett K.A., Stoinski T.S., Hof P.R., Bromage T.G., Mudakikwa A., Cranfield M.R., Sherwood C.C. (2013) Early brain growth cessation in wild Virunga mountain gorillas (*Gorilla beringei beringei*). *Am. J. Primatol.* **75**, 450-463.
393. Sterner K.S., McGowen M.R., Chugani H.T., Tarca A.L., Sherwood C.C., Hof P.R., Kuzawa C.W., Boddy A.M., Raam R.L., Weckle A., Lipovich L., Grossman L.I., Uddin M., Goodman M., Wildman D.E. (2013) Characterization of human cortical gene expression in relation to glucose utilization. *Am. J. Hum. Biol.* **25**, 418-430.
394. Höistad M., Heinsen H., Wicinski B., Schmitz C., Hof P.R. (2013) Stereological assessment of the dorsal anterior cingulate cortex in schizophrenia: absence of changes in neuronal and glial densities. *Neuropathol. Appl. Neurobiol.* **39**, 348-361.

395. Kövari E., Herrmann F.R., Hof P.R., Bouras C. (2013) The relationship between cerebral amyloid angiopathy and cortical microinfarcts in brain ageing and Alzheimer's disease. *Neuropathol. Appl. Neurobiol.* **39**, 498-509.
396. Babic M., Vogrinic Z., Diana A., Klepac N., Borovecki F., Hof P.R., Simic G. (2013) Comparison of two commercial enzyme-linked immunosorbent assays for cerebrospinal fluid measurement of amyloid β_{1-42} and total tau. *Transl. Neurosci.* **4**, 234-240.
397. Rados M., Nikic I., Rados M., Kostovic I., Hof P.R., Simic G. (2013) Functional reorganization of the primary motor cortex in a patient with a large arteriovenous malformation involving the precentral gyrus. *Transl. Neurosci.* **4**, 269-272.
398. Chouliaras L., Mastroeni D., Delvaux E., Grover A., Kenis G., Hof P.R., Steinbusch H.W.M., Coleman P.D., Rutten B.P.F., van den Hove D.L.A. (2013) Consistent decrease in global DNA methylation and hydroxymethylation in the hippocampus of Alzheimer's disease patients. *Neurobiol. Aging* **34**, 2091-2099.
399. Gama Sosa M.A., De Gasperi R., Paulino A.J., Pricop P.E., Shaughness M.C., Maudlin-Jeronimo E., Hall A.A., Janssen W.G.M., Yuk F.J., Dorr N.P., Dickstein D.L., McCarron R.M., Chavko M., Hof P.R., Ahlers S.T., Elder G.A. (2013) Blast overpressure induces shear-related injuries in the brain of rats exposed to a mild traumatic brain injury. *Acta Neuropathol. Commun.* **1**, 51.
400. Bianchi S., Stimpson C.D., Duka T., Larsen M.D., Janssen W.G.M., Collins Z., Bauernfeind A.L., Schapiro S.J., Baze W.B., McArthur M.J., Hopkins W.D., Wildman D.E., Lipovich L., Kuzawa C.W., Jacobs B., Hof P.R., Sherwood C.C. (2013) Synaptogenesis and development of pyramidal neuron dendritic morphology in the chimpanzee neocortex resembles humans. *Proc. Natl. Acad. Sci. USA* **110** (Suppl. 2), 10395-10401.
401. Bianchi S., Stimpson C.D., Bauernfeind A.L., Schapiro S.J., Baze W.B., McArthur M.J., Bronson E., Hopkins W.D., Semendeferi K., Jacobs B., Hof P.R., Sherwood C.C. (2013) Dendritic morphology of pyramidal neurons in the chimpanzee neocortex: specializations and comparison to humans. *Cereb. Cortex* **23**, 249-2436.
402. Kiessling M.C., Büttner A., Butti C., Müller-Starck J., Milz S., Hof P.R., Frank H.G., Schmitz C. (2013) Intact numbers of cerebellar Purkinje and granule cells in sudden infant death syndrome: a stereologic analysis and critical review of neuropathological evidence. *J. Neuropathol. Exp. Neurol.* **72**, 861-870.
403. Chouliaras L., van den Hove D.L.A., Kenis G., van Draanen M., Hof P.R., van Os J., Steinbusch H.M.W., Schmitz C., Rutten B.P.F. (2013) Histone deacetylase 2 in the mouse hippocampus: attenuation of age-related increase by caloric restriction. *Curr. Alzheimer Res.* **10**, 868-876.
404. Dickstein D.L., Weaver C.M., Luebke J.I., Hof P.R. (2013) Dendritic spine changes associated with normal aging. *Neuroscience* **251**, 21-32.
405. Chance S.A., Sawyer E.K., Clover L.M., Wicinski B., Hof P.R., Crow T.J. (2013) Hemispheric asymmetry in the fusiform gyrus distinguishes *Homo sapiens* from chimpanzees. *Brain Struct. Funct.* **218**, 1391-1405.

406. Baizer J.S., Paolone N.A., Sherwood C.C., Hof P.R. (2013) Neurochemical organization of the vestibular brainstem in the common chimpanzee. *Brain Struct. Funct.* **218**, 1463-1485.
407. Gu X., Hof P.R., Friston K.L., Fan J. (2013) Anterior insular cortex and emotional awareness. *J. Comp. Neurol.* **521**, 3371-3388.
408. Vogt B.A., Hof P.R., Zilles K., Vogt L.J., Herold C., Palomero-Gallagher N. (2013) Cingulate area 32 homologies in mouse, rat, macaque and human: cytoarchitecture and receptor architecture. *J. Comp. Neurol.* **521**, 4189-4203.
409. Teffer K., Buxhoeveden D.P., Stimpson C.D., Fobbs A.J., Schapiro S.S., Baze W.B., McArthur M.J., Hopkins W.D., Hof P.R., Sherwood C.C., Semendeferi K. (2013) Developmental changes in the spatial organization of neurons in the neocortex of humans and common chimpanzees. *J. Comp. Neurol.* **521**, 4249-4259.
410. Perez S.E., Raghanti M.A., Hof P.R., Kramer L., Ikonomovic M.D., Lacor P.N., Erwin J.M., Sherwood C.C., Mufson E.J. (2013) Alzheimer's disease pathology in the neocortex and hippocampus of the Western lowland gorilla (*Gorilla gorilla gorilla*). *J. Comp. Neurol.* **521**, 4318-4338.
411. Barks S.K., Bauernfeind A.L., Bonar C.J., Cranfield M.R., de Sousa A.A., Erwin J.M., Hopkins W.D., Lewandowski A.H., Mudakikwa A., Phillips K.A., Raghanti M.A., Stimpson C.D., Hof P.R., Zilles K., Sherwood C.C. (2014) Variable temporoinsular cortex neuroanatomy in primates suggests bottleneck effect in eastern gorillas. *J. Comp. Neurol.* **522**, 844-860.
412. Eilam-Stock T., Xu P., Cao M., Gu X., Van Dam N.T., Anagnostou E., Kolevzon A., Soorya L., Park Y., Siller M., He Y., Hof P.R., Fan J. (2014) Abnormal autonomic and associated brain activities during rest in autism spectrum disorder. *Brain* **137**, 153-171.
413. Uppal N., Giannatiempo I., Wicinski B., Schmeidler J., Heinsen H., Schmitz C., Buxbaum J.D., Hof P.R. (2014) Neuropathology of the posteroinferior occipital gyrus in children with autism. *Mol. Autism.* **5**, 17.
414. Müller-Starck J., Büttner A., Kiessling M.C., Angstmann N.B., Csaszar N.B.M., Haeussner H., Hochstrasser T., Sternecker K., Hof P.R., Milz S., Frank H.G., Schmitz C. (2014) No changes in cerebellar microvessel length density in sudden infant death syndrome: implications for pathogenetic mechanisms. *J. Neuropathol. Exp. Neurol.* **73**, 312-323.
415. Steele J.W., Brautigam H., Short J.A., Sowa A., Shi M., Yadav A., Weaver C.M., Westaway D., Fraser P.E., St. George-Hyslop P.H., Gandy S., Hof P.R., Dickstein D.L. (2014) Early fear memory defects are associated with altered synaptic plasticity and molecular architecture in the TgCRND8 Alzheimer's disease mouse model. *J. Comp. Neurol.* **522**, 2319-2335.
416. Guillozet-Bongaarts A.L., Hyde T.M., Dalley R.A., Hawrylycz M.J., Henry A., Hof P.R., Hohmann J., Jones A.R., Kuan C.L., Royall J., Shen E., Swanson B., Zeng H., Kleinmann J.E. (2014) Altered gene expression in the dorsolateral prefrontal cortex of individuals with schizophrenia. *Mol. Psychiatry* **19**, 478-485.

417. Raghanti M.A., Edler M.K., Meindl R.S., Sudduth J., Bohush T., Erwin J.M., Stimpson C.D., Hof P.R., Sherwood C.C. (2014) Humans and great apes share increased neocortical neuropeptide Y innervation compared to other haplorhine primates. *Front. Hum. Neurosci.* **8**, 101.
418. Jacobs B., Johnson N.L., Wahl D., Schall M., Maseko B.C., Lewandowski A., Raghanti M.A., Wicinski B., Butti C., Hopkins W.D., Bertelsen M.F., Walsh T., Roberts J.R., Reep R.L., Hof P.R., Sherwood C.C., Manger P.R. (2014) Comparative neuronal morphology of the cerebellar cortex in afrotherians, carnivores, cetartiodactyls, and primates. *Front. Neuroanat.* **8**, 24. Corrigendum, *Front. Neuroanat.* **8**, 69.
419. Schmitz C., Eastwood B.S., Tappan S.J., Glaser J.R., Peterson D.A., Hof P.R. (2014) Current automated 3D cell detection methods are not a suitable replacement for manual stereologic cell counting. *Front. Neuroanat.* **8**, 27.
420. Baizer J.S., Sherwood C.C., Noonan M., Hof P.R. (2014) Comparative organization of the claustrum: what does structure tell us about function? *Front. Syst. Neurosci.* **8**, 117.
421. Butti C., Fordyce R.E., Raghanti M.A., Gu X., Bonar C.J., Wicinski B.A., Wong E.W., Roman J., Brake A., Eaves E., Spocer M.A., Tang C.Y., Jacobs B., Sherwood C.C., Hof P.R. (2014) The cerebral cortex of the pygmy hippopotamus, *Hexaprotodon liberiensis* (Cetartiodactyla, Hippopotamidae): MRI, cytoarchitecture, and neuronal morphology. *Anat. Rec.* **297**, 670-700.
422. Wang X., Gu X., Fan J., Wang S., Zhao F., Hof P.R., Liu P., Gao Z. (2014) Recovery of empathetic function following resection of insular gliomas. *J. Neurooncol.* **117**, 269-277.
423. Fan J., Van Dam N.T., Gu X., Liu X., Wang H., Tang C.Y., Hof P.R. (2014) Quantitative characterization of functional anatomical contributions to cognitive control under uncertainty. *J. Cogn. Neurosci.* **26**, 1490-1506.
424. Lipovich L., Tarca A.L., Cai B., Jia H., Chugani H.T., Sterner K.S., Grossman L.I., Uddin M., Hof P.R., Sherwood C.C., Kuzawa C.W., Goodman M., Wildman D.E. (2014) Developmental changes in the transcriptome of human cerebral cortex: long noncoding RNA transcripts. *Cereb. Cortex* **24**, 1451-1459.
425. Bozek K., Wei Y., Yan Z., Liu X., Xiong J., Sugimoto M., Tomita M., Pääbo S., Pieszek R., Sherwood C.C., Hof P.R., Ely J.J., Steinhäuser D., Willmitzer L., Bangsbo J., Hansson O., Call J., Giavalisco P., Khaitovich P. (2014) Exceptional evolutionary divergence of human muscle and brain metabolomes parallels human cognitive and physical uniqueness. *PLoS Biol.* **12**, e1001871.
426. Gama Sosa G.A., De Gasperi R., Janssen P.L., Yuk F.J., Anazodo P.C., Pricop P.E., Paulino A.J., Wicinski B., Shaughness M.C., Maudlin-Jeronimo E., Hall A.A., Dickstein D.L., McCarron R.M., Chavko M., Hof P.R., Ahlers S.T., Elder G.A. (2014) Selective vulnerability of the cerebral vasculature to blast injury in a rat model of mild traumatic brain injury. *Acta Neuropathol. Commun.* **2**, 67.
427. Duka T., Anderson S.M., Collins Z., Raghanti M.A., Ely J.J., Hof P.R., Wildman D.E., Goodman M., Grossman L.I., Sherwood C.C. (2014) Synaptosomal lactate dehydrogenase isoenzyme composition is shifted toward aerobic forms in primate brain evolution. *Brain Behav. Evol.* **83**, 216-230.

428. Bauernfeind A.L., Barks S.K., Duka T., Grossman L.I., Hof P.R., Sherwood C.C. (2014) Aerobic glycolysis in the primate brain: reconsidering the implications for growth and maintenance. *Brain Struct. Funct.* **219**, 1149-1167.
429. Kiessling M.C., Büttner A., Butti C., Müller-Starck J., Milz S., Hof P.R., Frank H.G., Schmitz C. (2014) Cerebellar granule cells are generated postnatally in humans. *Brain Struct. Funct.* **219**, 1271-1286.
430. Patzke N., Olaleye O., Haagensen M., Hof P.R., Ihunwo A.O., Manger P.R. (2014) Organization and chemical neuroanatomy of the African elephant (*Loxodonta africana*) hippocampus. *Brain Struct. Funct.* **219**, 1587-1601.
431. Hopkins W.D., Meguerditchian A., Coulon O., Bogart S., Mangin J.F., Sherwood C.C., Grabowski M.W., Bennett A.J., Pierre P.J., Fears S., Woods R., Hof P.R., Vauclair J. (2014) Evolution of the central sulcus morphology in primates. *Brain Behav. Evol.* **84**, 19-30.
432. Uppal N., Wicinski B., Buxbaum J.D., Heinsen H., Schmitz C., Hof P.R. (2014) Neuropathology of the anterior midcingulate cortex in young children with autism. *J. Neuropathol. Exp. Neurol.* **73**, 891-902.
433. Kuzawa C.W., Chugani H.T., Grossman L.I., Lipovich L., Muzik O., Hof P.R., Wildman D.E., Sherwood C.C., Leonard W.R., Lange N. (2014) Metabolic costs and evolutionary implications of human brain development. *Proc. Natl. Acad. Sci. USA* **111**, 13010-13015.
434. Mitsis E.M., Riggio S., Kostakoglu L., Dickstein D.L., Machac J., Delman B., Golstein M., Jennings D., D'Antonio E., Martin J., Naidich T.P., Aloysi A., Fernandez C., Seibyl J., DeKosky S.T., Elder G.A., Marek K., Gordon W., Hof P.R., Sano M., Gandy S. (2014) Tauopathy PET and amyloid PET in the diagnosis of chronic traumatic encephalopathies: studies of a retired NFL player and of a man with FTD and a severe head injury. *Transl. Psychiatry* **4**, e441.
435. Baizer J.S., Wong K.M., Paolone N.A., Weinstock N., Salvi R.J., Manohar S., Witelson S.F., Baker J.F., Sherwood C.C., Hof P.R. (2014) Laminar and neurochemical organization of the dorsal cochlear nucleus of the human, monkey, cat, and rodents. *Anat. Rec.* **297**, 1865-1884.
436. Crary J.F., Trojanowski J.Q., Schneider J.A., Abisambra J.F., Abner E.L., Alafuzoff I., Arnold S.E., Attems J., Beach T.G., Bigio E.H., Cairns N.J., Dickson D.W., Gearing M., Grinberg L., Hof P.R., Hyman B.T., Jellinger K., Jicha G.A., Kovacs G.G., Knopman D.S., Kofler J., Kukull W.A., Mackenzie I.R., Masliah E., McKee A., Montine T.J., Murray M.E., Neltner J.H., Santa-Maria I., Seeley W.W., Serrano-Pozo A., Shelanski M.L., Stein T., Takao M., Thal D.R., Toledo J.B., Troncoso J.C., Vonsattel J.P., White C.L., Wisniewski T., Woltjer R.L., Yamada M., Nelson P.T. (2014) Primary age-related tauopathy (PART): a common pathology associated with human aging. *Acta Neuropathol.* **128**, 755-766.
437. Barks S.K., Calhoun M.E., Hopkins W.D., Cranfield M.R., Paterson P.E., Mudakikwa A., Erwin J.M., Stoinski T.S., Hecht E.E., Hof P.R., Sherwood C.C. (in press) Brain organization of gorillas reflects species differences in ecological specialization. *Am. J. Phys. Anthropol.*

438. Raghanti M.A., Spurlock L.N., Treichler F.R., Weigel S., George J.C., Stimmelmayr R., Butti C., Thewissen J.G.M., Sherwood C.C., Hof P.R. (in press) An analysis of von Economo neurons in the cerebral cortex of cetaceans, artiodactyls, and perissodactyls: emerging evidence for a phylogenetically ancient neuron type. *Brain Struct. Funct.*
439. Butti C., Janeway C.M., Townshend C., Wicinski B., Reidenberg J.S., Ridgway S.H., Sherwood C.C., Hof P.R., Jacobs B. (in press) The neocortex of cetartiodactyls. I. A comparative Golgi analysis of neuronal morphology in the bottlenose dolphin (*Tursiops truncatus*), the minke whale (*Balaenoptera acutorostrata*), and the humpback whale (*Balaenoptera novaeangliae*). *Brain Struct. Funct.*
440. Jacobs B., Harland T., Kennedy D., Schall M., Wicinski B., Butti C., Hof P.R., Sherwood C.C., Manger P.R. (in press) The neocortex of cetartiodactyls. II. Neuronal morphology of the visual and motor cortices in the giraffe (*Giraffa camelopardalis*). *Brain Struct. Funct.*
441. Gilissen E.P., Leroy K., Yilmaz Z., Kövari E., Bouras C., Boom A., Erwin J.M., Sherwood C.C., Hof P.R., Brion J.P. (in press) A neuronal aging pattern unique to humans and common chimpanzees. *Brain Struct. Funct.*
442. Luebke J.I., Medalla M., Amatrudo J.A., Crimins J.L., Hunt B., Weaver C.M., Hof P.R., Sethares C., Peters A. (in press) Age-related changes to layer 3 pyramidal cells in the rhesus monkey visual cortex. *Cereb. Cortex*.
443. Muntané G., Horvath J.E., Hof P.R., Ely J.J., Hopkins W.D., Raghanti M.A., Lewandowski A.H., Wray G.A., Sherwood C.C. (in press) Analysis of synaptic gene expression in the prefrontal cortex of primates reveals evolutionary changes in glutamatergic neurotransmission. *Cereb. Cortex*.
444. Stern E.R., Muratore A.F., Taylor S.F., Abelson J.L., Hof P.R., Goodman W.K. (in press) The persistence of experience: prior attentional and emotional state affects neural activity in a target detection task. *Cereb. Cortex*.

ARTICLES IN PROGRESS

Lipovich L., Hou Z.C., Jia H., Sinkler C., McGowen M., Sterner K., Weckle A., Hof P.R., Gatti D., Sherwood C.C., Kuzawa C.W., Grossman L.I., Goodman M., Wildman D.E. (in revision) High-throughput RNA sequencing reveals structural differences of orthologous brain-expressed genes between Western lowland gorillas and humans. *J. Comp. Neurol.*

Gu X., Eilam-Stock T., Zhou T., Anagnostou E., Kolevzon A., Soorya L., Hof P.R., Friston K.L., Fan J. (in revision) Autonomic and brain responses associated with empathy deficits in autism spectrum disorder. *Cereb. Cortex*.

Coskren P.J., Luebke J.I., Kabaso D., Yadav A., Rumbell T., Hof P.R., Weaver C.M. (in revision) Functional consequences of age-related morphologic changes to pyramidal neurons of the rhesus monkey prefrontal cortex. *J. Comput. Neurosci.*

Harony-Nicolas H., Bozdagi-Gunal O., Kay M., Daskalakis N., Klei L., Browne A., Uppal N., Dick S.A., O'Toole Á., Bigul D., Kou Y., Ma'ayan A., Roeder K., Zhang B., Hof P.R., Baxter M.G., Wagner S., Buxbaum J.D. (in revision) Oxytocin reverses social deficits in the Shank3-deficient rat model for autism. *Neuron*.

Coplan J.D., Fulton S.L., Reiner W., Jackowski A., Panthangi V., Perera T.D., Gorman J.M., Tang C.Y., Hof P.R., Kaffman A., Dwork A.J., Mathew S.J., Kaufman J., Mann J.J. (in revision) Cerebrospinal fluid 5-hydroxyindoleacetic acid in macaque monkeys following early life stress and relationship to hippocampal volume: implications for serotonin-related function in mood and anxiety disorders. *Front. Behav. Neurosci.*

Brautigam H., Steele J.W., Bogush A., Dickstein D.L., Kwok J.B.J., Schofield P.R., Hof P.R., Gandy S., Ehrlich M.E. (submitted) Presenilin 1 Δ exon 8 lacks catalytic function in brain *in vivo* and interacts *in trans* with wildtype PS1 in cultured cells. *Mol. Cell. Neurosci.*

Bauernfeind A.L., Soderblom E.J., Turner M.E., Moseley M.A., Ely J.J., Hof P.R., Sherwood C.C., Wray G.A., Babbitt C.C. (submitted) Transcript and protein abundance reveal highly divergent evolutionary differences in gene expression between the brains of humans and chimpanzees. *Genome Biol. Evol.*

Bauernfeind A.L., Reyzer M.L., Carioli R.M., Ely J.J., Babbitt C.C., Wray G.A., Hof P.R., Sherwood C.C. (submitted) High spatial resolution proteomic comparison of the brain in humans and chimpanzees. *J. Comp. Neurol.*

Sousa A.M.M., Zhu Y., Kitchen R.R., Meyer K.A., Imamura Kawasawa Y., Li M., Mele M., Carvalho T., Tebbenkamp A.T., Reimers M., Marques-Bonet T., Ely J.J., Hof P.R., Lifton R.P., Mane S.M., Noonan J.P., State M.W., Lein E.S., Knowles J.A., Sherwood C.C., Gerstein M.B., Sestan N. (submitted) The architecture and evolution of human and non-human primate brain transcriptomes. *Nat. Neurosci.*

Liu X., Han D., Guijarro Larraz P., Somel M., Jiang X., Hu H., Jiang S., Zhang N., Ely J.J., Sherwood C.C., Hof P.R., Pääbo S., Akbarian S., Khaitovich P. (submitted) Disruption of human-specific synaptogenesis program in autism. *Nat. Commun.*

West B.H., Hof P.R., Shively S., Purohit D.P., Luo X., Edgerton S.L., Diaz-Arrastia R., Sano M., Perl D.P. (submitted) Post-traumatic tauopathy in the elderly. *JAMA Neurol.*

Gama Sosa M.A., De Gasperi R., Janssen W.G.M., Hof P.R., Elder G.A. (submitted) The embryonic brain endothelial cell secretome is enriched in factors that regulate angiogenesis and neurogenesis. *J. Vasc. Res.*

Lardenoije R., Iatrou A., Kenis G., Komplotis K., Steinbusch H.W.M., Mastroeni D., Coleman P.D., Lemere C.A., Hof P.R., van den Hove D.J.A., Rutten B.P.F. (submitted) The epigenetics of aging and neurodegeneration. *Prog. Neurobiol.*

Lazarczyk M.J., Hof P.R., Xekardaki A., Bouras C., Giannakopoulos P. (submitted) Between overt pathology and incipient clinical expression: a two-step model of Alzheimer's disease. *Acta Neuropathol.*

Wegiel J., Flory M., Kuchna I., Nowicki K., Ma S.Y., Imaki H., Wegiel J., Frackowiak J., Mazur Kolecka B., Wierzba-Bobrowicz T., London E., Wisniewski T., Hof P.R., Brown T. (submitted) Neuronal nucleus and cytoplasm volume deficit in children with autism and volume increase in adolescents and adults. *Acta Neuropathol. Commun.*

Bozek K., Wei Y., Tan Z., Liu X., Xiong J., Sugimoto M., Tomita M., Pääbo S., Sherwood C.C., Hof P.R., Ely J.J., Steinhäuser D., Willmitzer L., Giavalisco P., Khaitovich P. (in preparation)

Large-scale lipidome analysis of human, chimpanzee, macaque, and mouse tissues reveals the unique features of human brain evolution. *Neuron*.

Weaver C.M., Yadav A., Hof P.R., Wearne S.L., Baker R., (in preparation) Computational modeling predicts a dendritic mechanism for plasticity of neuronal function. *PLoS Comput. Biol.*

Yadav A., Rumbell T., Luebke J.I., Hof P.R., Weaver C.M. (in preparation) Functional homeostasis in neurons: using ensemble techniques to extract parameter covariations. *J. Neurosci.*

Dickstein D.L., Varghese M., Walsh J.J., Dickstein D., Shih A.Y., Murayama H., Sarsoza F., Ku L., Eggert S., Hof P.R., Koo E.H., Tyan S.H. (in preparation) Changes in spine density and morphology in APP and APLP2 knockout mice: implications for novel APP function. *Mol. Cell. Neurosci.*

Raparia E., Coplan J.D., Abdallah C.G., Mao X., Hof P.R., Shungu D.C., Mathew S.J. (in preparation) The impact of childhood emotional abuse on neurometabolites of the rostral prefrontal cortex in patients with general anxiety disorder. *Psychiatry Res. Neuroimaging*.

Manger P.R., Patzke N., Spocter M.A., Gravett N., Karlsson K.Æ., Baghwandin A., Bennett N.C., Alagaili A.N., Mohammed O.B., Herculano-Houzel S., Bertelsen M.F., Hof P.R., Fuxe K. (in preparation) Specializations of potential thermogenetic mechanisms in cetacean brains. *Nature*.

Uppal N., Puri R., Yuk F., Janssen W.G.M., Dickstein D.L., Bozdagi-Günal O., Harony-Nicolas H., Buxbaum D.L., Hof P.R. (in preparation) Ultrastructural changes in the CA1 of *Shank3*-deficient mice. *Mol. Autism*.

Uppal N., Santos M., Butti C., Wicinski B., Giannakopoulos P., Wisniewski T., Zagzag D., Axelrod F.B., Norcliffe-Kaufmann L., Kaufmann H., Hof P.R. (in preparation) Von Economo neurons in familial dysautonomia: a clinicopathological exploration of their possible role in interoception. *Acta Neuropathol.*

Xekardaki A., Santos M., Uppal N., Höistad M., Wicinski B., Herrmann F.R., Bouras C., Heinsen H., Schmitz C., Giannakopoulos P., Hof P.R. (in preparation) Alterations of neuronal volumes and numbers in the right frontoinsular cortex in schizophrenia. *Acta Neuropathol. Commun.*

Simic G., de Silva R., Babic M., Buée L., Wischik C., Hof P.R. (in preparation) Tau protein hyperphosphorylation, misfolding, aggregation, and fragmentation: review and prospects for neuroprotective strategies against Alzheimer's disease. *Prog. Neurobiol.*

Butti C., Scata G., Brake A., Wicinski B., Rodriguez C., Sirpenski G., Hof P.R. (in preparation) The structure of the cerebral cortex in pinnipeds. *Anat. Rec.*

Butti C., Bauernfeind A.L., Spocter M.A., Raghanti M.A., Wicinski B., Bonar C.J., Marino L., Manger P.R., Sherwood C.C., Hof P.R. (in preparation) Glia-neuron index in mammals: evolution and adaptation. *Brain Struct. Funct.*

Van der Gucht E., Butti C., Bourne J.A., Hof P.R., Arckens L. (in preparation) Neurochemical and structural organization of the macaque monkey pregeniculate nucleus. *Brain Struct. Funct.*

Golden S.A., Smith M., Christoffel D.J., Hof P.R., Russo S.J. (in preparation) RAC1 controls stress-induced clustering of dendritic spines in the nucleus accumbens. *J. Comp. Neurol.*

Chadwick B., Dickstein D.L., Hof P.R., Baxter M.G., Hurd Y.L. (in preparation) Adolescent Δ^9 -tetrahydrocannabinol exposure alters the development of dendritic arbors and spines of rat medial prefrontal cortex pyramidal neurons. *Neuropsychopharmacology*.

Halene T.B., Kozlenkov A., Lin C.L., Guo Y., Giannaris E.L., Jiang Y., Hof P.R., Dracheva S., Hemby S.E., Akbarian S. (in preparation) Increased numbers of prefrontal white matter neurons in macaque monkeys exposed to anti-psychotic drugs. *Neuropsychopharmacology*.

Chouliaras L., Rutten B.P.F., Kenis G., Mastroeni D., Hof P.R., Steinbusch H.W.M., van Leeuwen F.W., van den Hove D.L.A. (in preparation) Age-related disturbances in DNA methylation and hydroxymethylation in the hippocampus of APPswe/PS1 Δ E9 transgenic mice. *J. Alzheimer Dis.*

Gandy S., Caesar I., Nilsson P.R., Hammarström P., Prokop S., Heppner F.L., Schmeidler J., Haroutunian V., Holtzman D.M., Hof P.R. (in preparation) Protein conformation alterations in Alzheimer's disease depend on apolipoprotein E isoform. *Curr. Alzheimer Res.*

Knezovic A., Osmanovic-Barilar J., Curlin M., Hof P.R., Hoyer S., Simic G., Riederer P., Salkovic-Petrisic M. (in preparation) Long-term cognitive deficits, neuropathological, and ultrastructural changes in the streptozotocin-induced rat model of Alzheimer's disease. *Transl. Neurosci.*

Shamy J.L., Avants B., Murray E.A., Morrison J.H., Baxter M.G., Hof P.R., Gee J., Rapp P.R. (in preparation) Translational methods for preclinical neuroimaging research: automated approaches using advanced normalization and FSL brain extraction tools. *J. Comp. Neurol.*

Hopkins W.D., Sherwood C.C., Schenker N., Hof P.R., Tagliafata J.P., Keller S. (in preparation) Broca's asymmetries are similar in humans and chimpanzees. *Nat. Neurosci.*

Bouras C., Kövari E., Herrmann F.R., Hof P.R. (in preparation) Synaptic loss in the hippocampus CA1 field is related to microvascular alterations and clinical severity in Alzheimer's disease. *Acta Neuropathol.*

REVIEW ARTICLES (non peer-reviewed)

1. Hof P.R. (1990) Selective disconnection of specific visual association pathways incases of Alzheimer's disease presenting with Balint's syndrome. *Parkinson/Alzheimer Digest* **6**, 25-28.
2. Morrison J.H., Hof P.R. (1992) The organization of the cerebral cortex: from molecules to circuits. *Disc. Neurosci.* **9(2)**, 1-80.
3. Hof P.R. (1993) Neuropathologie de la maladie d'Alzheimer: aspects expérimentaux récents. *Arch. Suisses Neurol. Psychiat.* **144**, 426-440.
4. Charnay Y., Vallet P.G., Giannakopoulos P., Hof P.R., Bouras C. (1994) Biologie moléculaire de l'amyloïde et maladie d'Alzheimer. *Rev. Neurol.* **150**, 405-412.

5. Hof P.R., Giannakopoulos P., Vickers J.C., Bouras C., Morrison J.H. (1995) The morphologic and neurochemical basis of dementia: aging, hierarchical patterns of lesion distribution, and vulnerable neuronal phenotype. *Rev. Neurosci.* **6**, 97-124.
6. Hof P.R., Morrison J.H. (1996) Hippocampal and neocortical involvement in normal brain aging and dementia: morphologic and neurochemical profile of the vulnerable circuits. *J. Am. Geriatr. Soc.* **44**, 857-864.
7. Hof P.R., Giannakopoulos P., Bouras C. (1996) The neuropathological changes associated with normal brain aging. *Histol. Histopathol.* **11**, 1075-1088.
8. Giannakopoulos P., Hof P.R., Giannakopoulos A.S., Herrmann F.R., Michel J.P., Bouras C. (1996) Alzheimer's disease pathology in centenarians. *Focus Neurol.* **1(4)**, 1-3.
9. Hof P.R. (1997) Morphology and neurochemical characteristics of the vulnerable neurons in brain aging and Alzheimer's disease. *Eur. Neurol.* **37**, 71-81.
10. Giannakopoulos P., Giannakopoulos A.S., Hof P.R., Michel J.P., Bouras C. (1997) Vieillissement cérébral normal et maladie d'Alzheimer: des lésions neuropathologiques à l'altération des fonctions cognitives. *Méd. Hyg.* **55**, 2201-2203.
11. Morrison B.M., Hof P.R., Morrison J.H. (1998) Selective neuronal vulnerability in neurodegenerative diseases. *Ann. Neurol.* **44 (Suppl. 1)**, S32-S44.
12. Giannakopoulos P., Hof P.R., Bouras C. (1998) Selective vulnerability of neocortical association areas in Alzheimer's disease. *Microsc. Res. Tech.* **43**, 16-23.
13. Morrison J., Hof P. (1999) Vie et mort des neurones dans le cerveau vieillissant. *La Recherche* **322**, 52-56.
14. Morrison J., Hof P. (1999) Vida y muerte de las neuronas en el cerebro que envejece. *Mundo Científico* **205**, 47-51.
15. Bussière T., Hof P.R., Delacourte A., Buée L. (2000) Maladies neurodégénératives et chromosome 17. *Alzheimer Actualités* **152**, 8-12.
16. Naidich T.P., Hof P.R., Yousry T.A. (2001) The motor cortex — Anatomic substrates of function. *Neuroimaging Clin. N. Am.* **11**, 171-193.
17. Naidich T.P., Hof P.R., Gannon P.J., Yousry T.A., Yousry I. (2001) Anatomic substrates of language — Emphasizing speech. *Neuroimaging Clin. N. Am.* **11**, 305-341.
18. Simic G., Diana A., Hof P.R. (2003) Phosphorylation pattern of tau associated with distinct changes of the growth cone cytoskeleton. *Prog. Mol. Subcell. Biol.* **32**, 33-48.
19. Morrison J.H., Hof P.R. (2003) Changes in cortical circuitry during aging. *Clin. Neurosci. Res.* **2**, 294-304.
20. Fatterpekar G.M., Delman B.N., Boonn W.W., Gultekin S.H., Fayad Z.A., Hof P.R., Naidich T.P. (2003) MR microscopy of normal human brain. *Magn. Reson. Imaging Clin. N. Am.* **11**, 641-653.

21. Bailey T., Rivara C.B., Rocher A.B., Hof P.R. (2004) The nature and effects of cortical microvascular pathology in aging and Alzheimer's disease. *Neurol. Res.* **26**, 573-578.
22. Marino L., Hof P.R. (2005) Nature's experiments in brain diversity. *Anat Rec.* **287**, 997-1000.
23. Schmitz C., van Kooten I.A.J., Hof P.R., van Engeland H., Patterson P.H., Steinbusch H.W.M. (2005) Autism: neuropathology, alterations of GABAergic function, and animal models. *Int. Rev. Neurobiol.* **71**, 1-26.
24. Casanova M.F., van Kooten I., Switala A.E., van Engeland H., Heinsen H., Steinbusch H.W.M., Hof P.R., Schmitz C. (2006) Abnormalities of cortical modular organization in the brains of autistic patients. *Clin. Neurosci. Res.* **6**, 127-133.
25. Simic G., Mladinov M., Judas M., Hof P.R., (2006) Brain asymmetries related to language with emphasis on entorhinal cortex and basal forebrain. *Cognit. Brain Behav.* **10**, 251-268.
26. Morrison J.H., Hof P.R. (2007) Life and death of neurons in the aging cerebral cortex. *Int. Rev. Neurobiol.* **81**, 41-57.
27. Segal D., Koschnick J.R., Slegers L.H.A., Hof P.R. (2007) Oligodendrocyte pathophysiology: a new view of schizophrenia. *Int. J. Neuropsychopharmacol.* **10**, 503-511.
28. Gold G., Kövari E., Hof P.R., Bouras C., Giannakopoulos P. (2007) Sorting out the clinical consequences of ischemic lesions in brain aging: a clinicopathological approach. *J. Neurol. Sci.* **257**, 17-22.
29. Imhof A., Kövari E., von Gunten A., Gold G., Rivara C.B., Herrmann F.R., Hof P.R., Bouras C., Giannakopoulos P. (2007) Morphological substrates of cognitive decline in nongenarians and centenarians: a new paradigm? *J. Neurol. Sci.* **257**, 72-79.
30. Boban M., Grbic K., Mladinov M., Hof P.R., Süßmair C., Ackl N., Stanic G., Bader B., Danek A., Simic G. (2007) Cerebrospinal fluid markers in differential diagnosis of Alzheimer's disease and vascular dementia. *Coll. Anthropol.* **32(Suppl. 1)**, 31-36.
31. Giannakopoulos P., Bouras C., Hof P.R. (2008) Clinicopathologic correlates in the oldest-old. *Neurobiol. Aging* **29**, 1137-1139.
32. Fossella J., Fan J., Liu X., Guise K., Brocki K., Hof P.R., Kittappa R., McKay R., Posner M. (2008) Provisional hypotheses for the molecular genetics of cognitive development: imaging genetic pathways in the anterior cingulate cortex. *Biol. Psychol.* **79**, 23-29.
33. Santos M., Kövari E., Gold G., Bozikas V.P., Hof P.R., Bouras C., Giannakopoulos P. (2009) The neuroanatomical model of post-stroke depression: towards a change of focus? *J. Neurol. Sci.* **283**, 158-162.
34. Simic G., Stanic G., Mladinov M., Jovanov-Milosevic N., Kostovic I., Hof P.R. (2009) Does Alzheimer's disease begin in the brainstem? *Neuropathol. Appl. Neurobiol.* **35**, 532-554.

35. Dickstein D.L., Walsh J., Brautigam H., Stockton Jr. S.D., Gandy S., Hof P.R. (2010) Role of vascular risk factors and vascular dysfunction in Alzheimer's disease. *Mt Sinai J. Med.* **77**, 82-102.
36. DeFelipe J., Fields R.D., Hof P.R., Höistad M., Kostovic I., Meyer G., Rockland K. (2010) Cortical white matter: beyond the pale — Remarks, main conclusions and discussion. *Front. Neuroanat.* **4**, 4, 28 pp.
37. Sesu-Simic D., Sedmak G., Hof P.R., Simic G. (2010) Recent advances in the neurobiology of attachment behavior. *Transl. Neurosci.* **1**, 148-159.
38. Chouliaras L., Siersma A.S.R., Kenis G., Prickaerts J., Lemmens M.A.M., Brasnjevic I., van Donkelaar E.L., Martinez-Martinez P., Losen M., De Baets M.H., Kholod N., van Leeuwen F., Hof P.R., van Os J., Steinbusch H.W.M., van den Hove D.L.A., Rutten B.P.F. (2010) Gene-environment interaction research and transgenic mouse models of Alzheimer's disease. *Int. J. Alzheimer Dis.* **2010**, ID 859101, 1-27.
39. Bloss E.B., Morrison J.H., Hof P.R., Dickstein D.L. (2011) Influence of aging and neurodegeneration on dendritic spine morphology. *Transl. Neurosci.* **2**, 49-60.
40. Polšek D., Jagatic T., Cepanec M., Hof P.R., Simic G. (2011) Recent developments in the neuropathology of autism spectrum disorders. *Transl. Neurosci.* **2**, 256-264.
41. Sherwood C.C., Bauernfeind A.L., Bianchi S., Raghanti M.A., Hof P.R. (2012) Human brain evolution writ large and small. *Prog. Brain Res.* **195**, 237-254.
42. Jovanov-Milosevic N., Petrovic D., Sedmak G., Vuksic M., Hof P.R., Simic G. (2012) Human fetal tau protein isoforms: possibilities for Alzheimer's disease treatment. *Int. J. Biochem. Cell Biol.* **44**, 1290-1294.
43. Lazarczyk M.J., Hof P.R., Bouras C., Giannakopoulos P. (2012) Preclinical Alzheimer's disease: identification of cases at risk among cognitively intact elderly individuals. *BMC Med.* **10**, 127.
44. Butti C., Santos M., Uppal N., Hof P.R. (2013) Von Economo neurons: clinical and evolutionary perspectives. *Cortex* **49**, 312-326.
45. Stefulj J., Panzenboeck U., Hof P.R., Simic G. (2013) Pathogenesis, modulation, and therapy of Alzheimer's disease: a perspective on roles of liver-X receptors. *Transl. Neurosci.* **4**, 349-356.
46. Jazvincsak Jembrek M., Babic M., Pivac N., Hof P.R., Simic G. (2013) Hyperphosphorylation of tau by GSK-3 β in Alzheimer's disease: the interaction of A β and sphingolipid mediators as a therapeutic target. *Transl. Neurosci.* **4**, 466-476.
47. Simic G., Babic M., Borovecki F., Hof P.R. (2014) Early failure of the default-mode network and the pathogenesis of Alzheimer's disease. *CNS Neurosci. Therap.* **20**, 692-698.
48. Babic M., Svob Strac D., Muck-Seler D., Pivac N., Stanic G., Hof P.R., Simic G. (2014) Update on the core and developing cerebrospinal fluid biomarkers for Alzheimer disease. *Croat. Med. J.* **55**, 347-365.

49. Simic G., Hof P.R. (2015) In search of the definitive Brodmann's map of cortical areas in human. *J. Comp. Neurol.* **523**, 5-14.
50. Bechter K., Benveniste H., Hof P.R. (in preparation) Quincke's *On the physiology of cerebrospinal fluid flow*, 1872 — A translation. *J. Comp. Neurol.*
51. Harony-Nicolas H., Bozdagi O., Uppal N., Hof P.R., Buxbaum J.D. (in preparation) SHANK proteins in autism spectrum disorders. *Mol. Autism*.
52. Uppal N., Harony-Nicolas H., Bozdagi O., Buxbaum J.D., Hof P.R. (in preparation) Autism spectrum disorders: neuropathology and animal models. *Acta Neuropathol.*
53. Fan J., Anagnostou E., Gridberg D., Gu X., Liu X., Hof P.R., Posner M.I. (in preparation) Neurobiology and neuroimaging of attention in autism spectrum disorders. *Mol. Autism*.

BOOKS AND MONOGRAPHS

1. Mobbs C.V., Hof P.R. (1998) Volume editors: *Functional Endocrinology of Aging. Interdiscipl. Top. Gerontol.* Vol. 29, C.K. Cassel, J.H. Morrison Series eds, Karger, Basel, viii + 246 pp.
2. Michel J.P., Hof P.R. (1999) Volume editors: *Management of Aging — The University of Geneva Experience. Interdiscipl. Top. Gerontol.* Vol. 30, C.K. Cassel, J.H. Morrison Series eds, Karger, Basel, x + 268 pp.
3. Hof P.R., Young W.G., Bloom F.E., Belichenko P.V., Celio M.R. (2000) *Comparative Cytoarchitectonic Atlas of the C57BL/6 and 129/Sv Mouse Brains*. Elsevier, Amsterdam, 275 pp. and CD-ROMs with *Atlas Navigator* software.
4. Hof P.R., Mobbs C.V. (2001) Editors: *Functional Neurobiology of Aging*. Academic Press, San Diego, xxvii + 960 pp.
5. Erwin J.M., Hof P.R. (2002) Volume editors: *Aging in Nonhuman Primates. Interdiscipl. Top. Gerontol.* Vol. 31, P.R. Hof, C.V. Mobbs Series eds, Karger, Basel, viii + 240 pp.
6. Kuchel G.A., Hof P.R. (2004) Volume editors: *Autonomic Nervous System in Old Age. Interdiscipl. Top. Gerontol.* Vol. 33, P.R. Hof, C.V. Mobbs Series eds, Karger, Basel, x + 134 pp.
7. Cronin-Golomb A., Hof P.R. (2004) Volume editors: *Vision in Alzheimer's Disease. Interdiscipl. Top. Gerontol.* Vol. 34, P.R. Hof, C.V. Mobbs Series eds, Karger, Basel, xii + 332 pp.
8. Mobbs C.V., Yen K., Hof P.R. (2006) Volume editors: *Mechanisms of Dietary Restriction in Aging and Disease. Interdiscipl. Top. Gerontol.* Vol. 35, P.R. Hof, C.V. Mobbs Series eds, Karger, Basel, viii + 198 pp.
9. Atsalis S., Margulis S.W., Hof P.R. (2008) Volume editors: *Primate Reproductive Aging: Cross-Taxon Perspectives. Interdiscipl. Top. Gerontol.* Vol. 36, P.R. Hof, C.V. Mobbs Series eds, Karger, Basel, viii + 200 pp.

10. Giannakopoulos P., Hof P.R. (2009) Volume editors: *Dementia in Clinical Practice. Front. Neurol. Neurosci.* Vol. 24, J. Bogousslavski Series ed., Karger, Basel, xii + 185 pp.
11. Hof P.R., Mobbs C.V. (2009) Editors: *Handbook of the Neuroscience of Aging*. Academic Press, London, xix + 690 pp.
12. Mobbs C.V., Hof P.R. (2010) Volume editors: *Body Composition and Aging. Interdiscipl. Top. Gerontol.* Vol. 37, P.R. Hof, C.V. Mobbs Series eds, Karger, Basel, vi + 197 pp.
13. Johnson J.I., Ziegler H.P., Hof P.R. (2011) Editors: *New Perspectives on Neurobehavioral Evolution. Ann. N.Y. Acad. Sci.* Vol. 1225, viii + 203 pp.
14. Johnson J.I., Ziegler H.P., Hof P.R. (2011) Editors: *Resources and Technological Advances for Studies of Neurobehavioral Evolution. Ann. N.Y. Acad. Sci.* Vol. 1225, Suppl. 1, ii + 191 pp.
15. Buxbaum J.D., Hof P.R. (2012) Editors: *The Neuroscience of Autism Spectrum Disorders*. Academic Press, San Diego, xii + 480 pp.
16. Hof P.R., Baxter M.G., Mobbs C.V. (in preparation) Editors: *Functional Neurobiology of Aging*, 2nd ed. Academic Press, San Diego, pp.

BOOK CHAPTERS

1. Schaad N., Hof P.R. (1988) Les myorelaxants non curarisants. In: *Pharmacologie: Des Concepts Fondamentaux aux Applications Thérapeutiques*, M. Schorderet éd., Slatkine, Genève, pp. 119-124.
2. Magistretti P.J., Martin J.L., Hof P.R. (1990) Modulation of energy metabolism by vasoactive intestinal peptide, adenosine, and K⁺ in the cerebral cortex: focus on the cellular level. In: *Neuropsychopharmacology*, W.E. Bunney Jr, H. Hippius, G. Laakman, M. Schmauss eds, Springer, Berlin, pp. 474-487.
3. Schaad N., Hof P.R. (1992) Les myorelaxants non curarisants. In: *Pharmacologie: Des Concepts Fondamentaux aux Applications Thérapeutiques*, 2ème Edition, M. Schorderet éd., Frison Roche-Slatkine, Genève, pp. 119-124.
4. Magistretti P.J., Martin J.L., Hof P.R., Palacios J.M. (1992) Vasoactive intestinal peptide (VIP) receptors. In: *Handbook of Chemical Neuroanatomy Vol. 11, Neuropeptide Receptors in the CNS*, A. Björklund, T. Hökfelt, M.J. Kuhar eds, Elsevier, Amsterdam, pp. 347-395.
5. Bouras C., Hof P.R. (1992) Neuropathologie de la maladie d'Alzheimer. In: *L'Encyclopédie Médico-Chirurgicale, Psychiatrie*, Editions Techniques, Paris, référence 37280 A²⁰, pp. 1-12.
6. Glezer I.I., Hof P.R., Leranth C., Morgane P.J. (1992) Morphological and histochemical features of odontocete visual cortex: immunocytochemical analysis of pyramidal and non-pyramidal populations of neurons. In: *Marine Mammal Sensory Systems*, J. Thomas, R. Kastelein, A. Supin eds, Plenum, New York, pp. 1-38.

7. Hof P.R., Lüth H.J., Rogers J.H., Celio M.R. (1993) Calcium-binding proteins define subpopulations of interneurons in the cingulate cortex. In: *Neurobiology of Cingulate Cortex and Limbic Thalamus: A Comprehensive Handbook*, B.A. Vogt, M. Gabriel eds, Birkhäuser, Boston, pp.181-205.
8. Crino P.B., Morrison J.H., Hof P.R. (1993) Monoaminergic systems in the monkey cingulate cortex. In: *Neurobiology of Cingulate Cortex and Limbic Thalamus: A Comprehensive Handbook*, B.A. Vogt, M. Gabriel eds, Birkhäuser, Boston, pp. 285-310.
9. Hof P.R., Morrison J.H. (1994) The cellular basis of cortical disconnection in Alzheimer disease and related dementing conditions. In: *Alzheimer Disease*, R.D. Terry, R. Katzman, K.L. Bick eds, Raven Press, New York, pp. 197-229.
10. Buée L., Vermersch P., Hof P.R., Défossez A., Delacourte A. (1994) Alzheimer's disease vasculopathy. In: *Vascular Dementia, Current Issues in Neurodegenerative Diseases*, Vol. 6, D. Leys, P. Scheltens eds, ICG Publications, Dordrecht, pp. 155-166.
11. Glezer I.I., Hof P.R., Istomin V.V., Morgane P.J. (1995) Comparative immuno-cytochemistry of calcium-binding protein-positive neurons in visual and auditory systems of cetacean and primate brains. In: *Sensory Systems of Aquatic Mammals*, R.A. Kastelein, J.A. Thomas, P.E. Nachtigall eds, De Spil, Woerden, pp. 477-513.
12. Bloom F.E., Young W.G., Nimchinsky E.A., Hof P.R., Morrison J.H. (1997) Neuronal vulnerability and informatics in human disease. In: *Progress in Neuroinformatics Research Vol. 1, Neuroinformatics — An Overview of the Human Brain Project*, S.H. Koslow, M.F. Huerta eds, Lawrence Erlbaum, Mahwah, pp. 83-123.
13. Vogt B.A., Vogt L.J., Nimchinsky E.A., Hof P.R. (1997) Primate cingulate cortex chemoarchitecture and its disruption in Alzheimer's disease. In: *Handbook of Chemical Neuroanatomy Vol. 13, The Primate Nervous System Part I*, F.E. Bloom, A. Björklund, T. Hökfelt eds, Elsevier, Amsterdam, pp. 455-528.
14. Morrison J.H., Hof P.R., Huntley G.W. (1998) Neurochemical organization of the primate visual cortex. In: *Handbook of Chemical Neuroanatomy Vol. 14, The Primate Nervous System Part II*, F.E. Bloom, A. Björklund, T. Hökfelt eds, Elsevier, Amsterdam, pp. 299-430.
15. Schaad N., Hof P.R. (1998) Les myorelaxants non curarisants. In: *Pharmacologie: Des Concepts Fondamentaux aux Applications Thérapeutiques*, 3ème Edition, M. Schorderet éd., Frison Roche-Slatkine, Genève, pp. 122-127.
16. Hof P.R., Trapp B.D., de Vellis J., Claudio L., Colman D.R. (1998) The cellular components of nervous tissue. In: *Fundamental Neuroscience*, M.J. Zigmund, F.E. Bloom, S.C. Landis, J.L. Roberts, L.R. Squire eds, Academic Press, San Diego, pp. 41-70.
17. Morrison B.M., Hof P.R., Morrison J.H. (1998) Determinants of neuronal vulnerability in neurodegenerative disease. In: *Neuroprotection in Parkinson's Disease, Beyond the Decade of the Brain*, Vol. 3, C.W. Olanow, P. Jenner eds, Wells Medical, Royal Turnbridge Wells, pp. 69-87.

18. Buée L., Hof P.R., Delacourte A. (1998) Alzheimer's disease vasculopathy. In: *Stroke and Alzheimer's disease, Current Issues in Neurodegenerative Diseases*, Vol. 9, D. Leys, F. Pasquier, P. Scheltens eds, Holland Academic Graphics, The Hague, pp. 101-111.
19. Hof P.R., Morrison J.H. (1999) The cellular basis of cortical disconnection in Alzheimer disease and related dementing conditions. In: *Alzheimer Disease*, 2nd Edition, R.D. Terry, R. Katzman, K.L. Bick, S.S. Sisodia eds, Lippincott, Williams & Wilkins, Philadelphia, pp. 207-232.
20. Hof P.R., Bouras C., Morrison J.H. (1999) Cortical neuropathology in aging and dementing disorders: neuronal typology, connectivity, and selective vulnerability. In: *Cerebral Cortex Vol. 14, Neurodegenerative and Age-Related Changes in Cerebral Cortex*, A. Peters, J.H. Morrison eds, Kluwer Academic-Plenum, New York, pp. 175-312.
21. Vogt B.A., Martin A., Vrana K.E., Absher J.R., Vogt L.J., Hof P.R. (1999) Multifocal cortical neurodegeneration and subtypes within Alzheimer's disease. In: *Cerebral Cortex Vol. 14, Neurodegenerative and Age-Related Changes in Cerebral Cortex*, A. Peters, J.H. Morrison eds, Kluwer Academic-Plenum, New York, pp. 553-602.
22. Bouras C., Gold G., Kövari E., Vallet P.G., Duc M., Michel J.P., Hof P.R., Giannakopoulos P. (1999) Neuroanatomy of apraxia and visual agnosia in Alzheimer's disease. In: *International Network of Aging — The Geneva Experience, Interdisciplinary Topics in Gerontology*, Vol. 30, J.P. Michel, P.R. Hof eds, Karger, Basel, pp. 135-152.
23. Giannakopoulos P., Kövari E., Canuto A., Hof P.R., Bouras C. (1999) Presenilin-1 immunoreactivity in human neurodegenerative diseases. In: *International Network of Aging — The Geneva Experience, Interdisciplinary Topics in Gerontology*, Vol. 30, J.P. Michel, P.R. Hof eds, Karger, Basel, pp. 153-164.
24. Giannakopoulos P., Kövari, E., Gold G., Hof P.R., Bouras C. (2001) Types of age-related brain lesions and relationship to neuropathologic diagnostic systems of Alzheimer's disease. In: *Functional Neurobiology of Aging*, P.R. Hof, C.V. Mobbs eds, Academic Press, San Diego, pp. 62-73.
25. Bussière T., Hof P.R. (2001) Morphological changes in the human cerebral cortex during normal aging. In: *Functional Neurobiology of Aging*, P.R. Hof, C.V. Mobbs eds, Academic Press, San Diego, pp. 74-81.
26. Bouras C., Vallet P.G., Kövari E., Michel J.P., Herrmann F.R., Hof P.R., Giannakopoulos P. (2001) Longevity and brain aging: the paradigm of centenarians. In: *Functional Neurobiology of Aging*, P.R. Hof, C.V. Mobbs eds, Academic Press, San Diego, pp. 82-90.
27. Hof P.R. (2001) Regional and laminar patterns of selective neuronal vulnerability in Alzheimer's disease. In: *Functional Neurobiology of Aging*, P.R. Hof, C.V. Mobbs eds, Academic Press, San Diego, pp. 91-105.
28. Vogt B.A., Vogt L.J., Hof P.R. (2001) Patterns of cortical neurodegeneration in Alzheimer's disease: subgroups, subtypes, and implication for staging strategies. In: *Functional Neurobiology of Aging*, P.R. Hof, C.V. Mobbs eds, Academic Press, San Diego, pp. 106-124.

29. Gold G., Bouras C., Michel J.P., Hof P.R., Giannakopoulos P. (2001) Vascular dementia. In: *Functional Neurobiology of Aging*, P.R. Hof, C.V. Mobbs eds, Academic Press, San Diego, pp. 125-137.
30. Giannakopoulos P., Kövari, E., Gold G., Hof P.R., Bouras C. (2001) Frontotemporal dementias: from classification problems to pathogenetic uncertainties. In: *Functional Neurobiology of Aging*, P.R. Hof, C.V. Mobbs eds, Academic Press, San Diego, pp. 138-147.
31. Hof P.R., Duan H. (2001) Age-related morphologic alterations in the brain of Old World and New World anthropoid monkeys. In: *Functional Neurobiology of Aging*, P.R. Hof, C.V. Mobbs eds, Academic Press, San Diego, pp. 435-446.
32. Erwin J.M., Nimchinsky E.A., Gannon P.J., Perl D.P., Hof P.R. (2001) The study of brain aging in great apes. In: *Functional Neurobiology of Aging*, P.R. Hof, C.V. Mobbs eds, Academic Press, San Diego, pp. 447-456.
33. Gannon P.J., Kheck N.M., Hof P.R. (2001) Language areas in the hominoid brain: a dynamic communicative shift on the Upper East Side planum. In: *Evolutionary Anatomy of the Primate Cerebral Cortex*, D. Falk, K. Gibson eds, Cambridge University Press, Cambridge, pp. 216-240.
34. Bouras C., Savioz A., Kövari E., Giannakopoulos P., Hof P.R., Vallet P.G. (2001) Neuropathologie de la maladie d'Alzheimer. In: *L'Encyclopédie Médico-Chirurgicale, Psychiatrie*, Editions Scientifiques et Médicales Elsevier, Paris, référence 37-540-B-20, pp. 1-15.
35. Erwin J.M., Hof P.R., Ely J.J., Perl D.P. (2002) One gerontology: advancing understanding of aging through studies of great apes and other primates. In: *Aging in Nonhuman Primates. Interdiscipl. Top. Gerontol.* Vol. 31, J.M. Erwin, P.R. Hof eds, Karger, Basel, pp. 1-21.
36. Hof P.R., Gilissen E.P., Sherwood C.C., Duan H., Lee P.W.H., Delman B.N., Naidich T.P., Gannon P.J., Perl D.P., Erwin J.M. (2002) Comparative neuropathology of brain aging in primates. In: *Aging in Nonhuman Primates. Interdiscipl. Top. Gerontol.* Vol. 31, J.M. Erwin, P.R. Hof eds, Karger, Basel, pp. 130-154.
37. Morrison J.H., Hof P.R. (2002) Selective vulnerability of corticocortical and hippocampal circuits in aging and Alzheimer's disease. In: *Changing Views of Cajal's Neuron*, E.C. Azmitia, J. DeFelipe, E.G. Jones, P. Rakic, C.E. Ribak eds, *Prog. Brain Res.* Vol. 136, Elsevier, Amsterdam, pp. 467-486.
38. Hof P.R., Trapp B.D., de Vellis J., Claudio L., Colman D.R. (2003) The cellular components of nervous tissue. In: *Fundamental Neuroscience*, 2nd Edition, L.R. Squire, F.E. Bloom, S.K. McConnell, J.L. Roberts, N.C. Spitzer, M.J. Zigmund eds, Academic Press, San Diego, pp. 49-78.
39. Hof P.R., Bussière T., Buxbaum J.D., Morrison J.H. (2003) Neurobiological basis of age-related dementing disorders. In: *Geriatric Medicine*, 4th edition, C.K. Cassel, R.M. Leipzig, H.J. Cohen, E.B. Larson, D.E. Meier eds, Springer, New York, pp. 1095-1111.

- 40 Hof P.R., Trapp B.D., de Vellis J., Claudio L., Colman D.R. (2004) Cellular components of nervous tissue. In: *From Molecules to Networks — An Introduction to Cellular and Molecular Neuroscience*, J.H. Byrne, J.L. Roberts eds, Academic Press, San Diego, pp. 1-29.
41. Glezer I.I., Hof P., Morgane P.J., Fridman A., Isakova T., Joseph D., Nair A., Parhar P., Thengampallil A., Thomas S., Venugopal R., Jung G.H. (2004) Chemical neuroanatomy of the inferior colliculus in brains of echolocating and non-echolocating mammals: immunocytochemical study. In: *Echolocation in Bats and Dolphins*, J. Thomas, C.F. Moss, M. Vater eds, University of Chicago Press, Chicago, pp. 161-175.
42. Vogt B.A., Hof P.R., Vogt L.J. (2004) Cingulate gyrus. In: *The Human Nervous System*, 2nd edition, G. Paxinos, J.K. Mai eds, Academic Press, San Diego, pp. 916-949.
43. Hof P.R., Bussière T., Morrison J.H. (2004) Ageing changes in the brain. In: *The Neuropathology of Dementia*, 2nd Edition, M.M. Esiri, V.M.Y. Lee, J.Q. Trojanowski eds, Cambridge University Press, Cambridge, pp. 113-127.
44. von Gunten, A., Giannakopoulos P., Bouras C., Hof P.R. (2004) Neuropathologic changes in posterior cortical atrophy. In: *Vision in Alzheimer's Disease, Interdiscipl. Top. Gerontol.* Vol. 34, A. Cronin-Golomb, P.R. Hof eds, Karger, Basel, pp. 30-61.
45. Morrison J.H., Hof P.R., Rapp P.R. (2005) Neuropathology of normal aging in cerebral cortex. In: *Neurodegenerative Diseases*, M.F. Beal, A.E. Lang, A. Ludolph eds, Cambridge University Press, Cambridge, pp. 396-406.
46. Perl D.P., Hof P.R. (2005) Western Pacific ALS/Parkinsonism-dementia complex. In: *Neurodegenerative Diseases*, M.F. Beal, A.E. Lang, A. Ludolph eds, Cambridge University Press, Cambridge, pp. 827-843.
47. Hof P.R., Sherwood C.C. (2007) The evolution of neuron classes in the neocortex of mammals. In: *Evolution of Nervous Systems*, Vol. 3, J. Kaas, G. Striedter, T. Bullock, T. Preuss, J. Rubenstein, L. Krubitzer eds, Academic Press, San Diego, pp. 113-124.
48. Sherwood C.C., Hof P.R. (2007) The evolution of neuron types and cortical histology in apes and humans. In: *Evolution of Nervous Systems*, Vol. 4, J. Kaas, G. Striedter, T. Bullock, T. Preuss, J. Rubenstein, L. Krubitzer eds, Academic Press, San Diego, pp. 355-378.
49. Schenker N.M., Sherwood C.C., Hof P.R., Semendeferi K. (2007) Microstructural asymmetries of the cerebral cortex in humans and other mammals. In: *The Evolution of Hemispheric Specialization in Primates, Special Topics in Primatology* Vol. 5, W.D. Hopkins ed., American Society of Primatologists, Norman, pp. 93-118.
49. Schmitz C., Hof P.R. (2007) Design-based stereology in brain aging research. In: *Brain Aging: Models, Methods, and Mechanisms*, D. Riddle ed., Taylor and Francis, Boca Raton, pp. 63-96.
50. Hof P.R., de Vellis J., Nimchinsky E.A., Kidd G., Claudio L., Trapp B.D. (2008) Cellular components of nervous tissue. In: *Fundamental Neuroscience*, 3rd Edition, L. Squire, D. Berg, F. Bloom, S. Du Lac, A. Ghosh, N.C. Spitzer eds, Academic Press, San Diego, pp. 41-58.

51. Erwin J.M., Hof P.R. (2008) Menopause and reproductive senescence in comparative context. In: *Primate Reproductive Aging: Cross-Taxon Perspectives. Interdiscipl. Top. Gerontol.* Vol. 36, S. Atsalis, S.W. Margulis, P.R. Hof eds, Karger, Basel, pp. 4-16.
52. Perl D.P., Hof P.R. (2008) Πλαγια μυατροφικη σκλερυσινη/Παρκινσονισμος — Ανοια Complex του Guam. In: Η Νοος του Παρκινσον, G. Mentenopoulos, C. Bouras eds, University Studio Press, Thessaloniki, pp. 263-306.
53. Hof P.R., Nimchinsky E.A., Kidd G., Claudio L., Trapp B.D. (2009) Cellular components of nervous tissue. In: *From Molecules to Networks — An Introduction to Cellular and Molecular Neuroscience*, 2nd Edition, J.H. Byrne, J.L. Roberts eds, Academic Press, San Diego, pp. 1-17.
54. Giannakopoulos P., Kövari E., Gold G., von Gunten A., Hof P.R., Bouras C. (2009) Pathological substrates of cognitive decline in Alzheimer's disease. In: *Dementia in Clinical Practice. Front. Neurol. Neurosci.* Vol. 24, P. Giannakopoulos, P.R. Hof eds, Karger, Basel, pp. 20-29.
55. Holloway R.L., Sherwood C.C., Rilling J.K., Hof P.R. (2009) Evolution of the brain: in humans — Paleoneurology. In: *Encyclopedia of Neuroscience*, M.D. Binder, N. Hirokawa, U. Windhorst, M.C. Hirsch eds, Springer Verlag, New York, pp. 1326-1334.
56. Sherwood C.C., Rilling J.K., Holloway R.L., Hof P.R. (2009) Evolution of the brain: in humans — Specializations in a comparative perspective. In: *Encyclopedia of Neuroscience*, M.D. Binder, N. Hirokawa, U. Windhorst, M.C. Hirsch eds, Springer Verlag, New York, pp. 1334-1338.
57. Mobbs C.V., Hof P.R. (2009) Environment versus heredity in normal and pathological aging of neurological functions. In: *Handbook of the Neuroscience of Aging*, P.R. Hof, C.V. Mobbs eds, Academic Press, London, pp. 1-4.
58. Vogt B.A., Fountoulakis N., Samaras D., Kövari E., Vogt L.J., Hof P.R. (2009) Cingulate neuropathological substrates of depression. In: *Cingulate Neurobiology and Disease*, B.A. Vogt, ed., Oxford, Oxford University Press, pp. 537-569.
59. Vogt B.A., Vogt L.J., Purohit D.P., Hof P.R. (2009) Cingulate subregional neuropathology in dementia with Lewy bodies and Parkinson's disease with dementia. In: *Cingulate Neurobiology and Disease*, B.A. Vogt, ed., Oxford, Oxford University Press, pp. 707-725.
60. Vogt B.A., Vogt L.J., Perl D.P., Hof P.R. (2009) Cingulate neuropathology in anterior and posterior cortical atrophies in Alzheimer's disease. In: *Cingulate Neurobiology and Disease*, B.A. Vogt, ed., Oxford, Oxford University Press, pp. 763-799.
61. Dickstein D.L., Morrison J.H., Hof P.R. (2009) Neuropathology of aging. In: *Imaging the Aging Brain*, W. Jagust, M. D'Esposito eds, Oxford University Press, Oxford, pp. 27-40.
62. Kaufman J.A., Tyszka J.M., Patterson F., Erwin J.M., Hof P.R., Allman J.M. (2010) Structural and diffusion MRI of a gorilla brain performed *ex vivo* at 9.4 Tesla. In: *The Human Brain Evolving: Paleoneurological Studies in Honor of Ralph L. Holloway*, D. Broadfield, M. Yuan, K. Schick, M. Toth eds, Stone Age Institute Press, Gosport, pp. 171-181.

63. Raghanti M.A., Hof P.R., Sherwood C.C. (2010) The evolution of cortical neurotransmitter systems among primates and their relevance to cognition. In: *The Human Brain Evolving: Paleoneurological Studies in Honor of Ralph L. Holloway*, D. Broadfield, M. Yuan, K. Schick, M. Toth eds, Stone Age Institute Press, Gosport, pp. 195-212.
64. Uppal N., Hof P.R. (2012) Discrete cortical neuropathology in autism spectrum disorders. In: *The Neuroscience of Autism Spectrum Disorders*, J.D. Buxbaum, P.R. Hof eds, Academic Press, San Diego, pp. 313-325.
65. Hof P.R., Kidd G., DeFelipe J., de Vellis J., Gama-Sosa M.A., Elder G.A., Trapp B.D. (2013) Cellular components of nervous tissue. In: *Fundamental Neuroscience*, 4th Edition, L.R. Squire, D. Berg, F.E. Bloom, S. Du Lac, A. Ghosh, N.C. Spitzer eds, Academic Press, San Diego, pp. 41-59.
66. Hof P.R., Kidd G., DeFelipe J., de Vellis J., Gama-Sosa M.A., Elder G.A., Trapp B.D. (2014) Cellular components of nervous tissue. In: *From Molecules to Networks — An Introduction to Cellular and Molecular Neuroscience*, 3rd Edition, J.H. Byrne, R. Heidelberger, M.N. Waxham eds, Academic Press, San Diego, pp. 3-21.
67. Uppal N., Hof P.R. (2014) A stereologic perspective on neuropathology of autism. In: *Neurostereology: Unbiased Stereology of Neural Systems*, P.R. Mouton ed., Wiley Blackwell, Oxford, pp. 237-256.
68. Raghanti M.A., Spurlock L.B., Uppal N., Sherwood C.C., Butti C., Hof P.R. (in press) Von Economo neurons. In: *Brain Mapping: An Encyclopedic Reference*, A.W. Toga, K. Zilles, K. Amunts eds, Elsevier, Amsterdam, pp.
69. Spoerl M.A., Raghanti M.A., Butti C., Hof P.R., Sherwood C.C. (in press) The minicolumn in comparative context. In: *Recent Advances in the Modular Organization of the Cerebral Cortex*, M. Casanova ed., Springer, Heidelberg, pp.

CHAPTERS IN CONFERENCE PROCEEDINGS

1. Magistretti P.J., Schorderet M., Hof P.R., Schaad N. (1987) Interactions between vasoactive intestinal peptide and norepinephrine, ergot alkaloids and prostanoids in mouse cerebral cortex. In: *Receptor-Receptor Interactions*, L.F. Agnati, K. Fuxe eds, *Wenner-Gren International Symposium Series* **48**, MacMillan Press Ltd., London, pp. 272-283.
2. Magistretti P.J., Dietl M.M., Hof P.R., Martin J.L., Palacios, J.M., Schaad N., Schorderet M. (1988) VIP as a mediator of intercellular communication in the cerebral cortex: release, receptors, actions and interactions with norepinephrine. In: *Vasoactive Intestinal Peptide and Related Peptides*, S.I. Said, V. Mutt eds, *Ann. N.Y. Acad. Sci.* **527**, 110-129.
3. Magistretti P.J., Hof P.R. (1988) Cellular expression of epilepsy alleles: altered regulation of glycogen metabolism by neurotransmitters in the neocortex of the spontaneously epileptic mouse mutants, *tottering* and *quaking*. In: *Molecular Genetic Mechanisms in Neurologic Disorders*, P. Brown, L.C. Bolis, D.C. Gajdusek eds, *Disc. Neurosci.* **5(3)**, 140-143.

4. Hof P.R., Pascale E., Magistretti P.J. (1988) Extracellular potassium as a regulator of glycogen hydrolysis in the cerebral cortex: studies in normal mice and in the spontaneously epileptic *quaking* mutant. In: *Advances in Biotechnology of Membrane Ion Transport*, P.L. Jørgensen, C. Verna eds, *Serono Symposium Series* **51**, Raven Press, New York, pp. 25-36.
5. Morrison J.H., Lewis D.A, Campbell M.J., Higgins G.A., Hof P.R., Cox K. (1988) Anatomic and molecular characteristics of vulnerable neocortical neurons in Alzheimer's disease. In: *The Molecular Biology of Alzheimer's Disease*, C.E. Finch, P. Davies eds, *Current Communications in Molecular Biology*, Cold Spring Harbor Laboratory, New York, pp. 10-14.
6. Magistretti P.J., Hof P.R., Martin J.L., Stoyanov T. (1989) Neurotransmitters and their involvement in the regulation of energy metabolism in the nervous system. In: *Peripheral Neuropathies 1988. What is Significantly New?* J.P. Assal, C. Liniger eds, *Fidia Research Series* **21**, Liviana Press, Padova, pp. 29-44.
7. Magistretti P.J., Hof P.R. (1989) Abnormal regulation of glycogen metabolism by neurotransmitters and potassium in the neocortex of the spontaneously epileptic mouse mutants *quaking* and *tottering*. In: *Reflex Seizures and Reflex Epilepsies*, R.A. Beaumanoir, H. Gastaut, R. Naquet eds, Médecine et Hygiène, Genève, pp. 25-30.
8. Morrison J.H., Hof P.R., Campbell M.J., De Lima A.D., Voigt T., Bouras C., Cox K., Young W.G. (1990) Cellular pathology in Alzheimer's disease: implications for corticocortical disconnection and differential vulnerability. In: *Imaging, Cerebral Topography and Alzheimer's Disease*, S.I. Rapoport, H. Petit, D. Leys, Y. Christen eds, *Research and Perspectives in Alzheimer's Disease*, Springer, Berlin, pp. 19-40.
9. Morrison J.H., Hof P.R., Bouras C. (1991) An anatomical substrate for visual disconnection in Alzheimer's disease. In: *Aging and Alzheimer's Disease — Sensory systems, Neuronal Growth, and Neuronal Metabolism*, J.H. Growdon, S. Corkin, E. Ritter-Walker, R.J. Wurtman eds, *Ann. N.Y. Acad. Sci.* **640**, 36-43.
10. Giannakopoulos P., Bouras C., Hof P.R., Michel J.P. (1993) Neuropathological evaluation of 923 patients from a geriatric hospital. In: *Alzheimer Disease and Related Disorders*, M. Nicolini, P.F. Zatta, B. Corain eds, *Advances in the Biosciences* **87**, Pergamon Press, London, pp. 137-143.
11. Buée L., Ding W., Hof P.R., Boyle N.J., Anderson J.P., Morrison J.H., Robakis N.K., Delacourte A., Fillit H.M. (1993) Alzheimer's disease: binding of vascular and neuroblastoma heparan sulfate proteoglycans to amyloid β protein A4. In: *Alzheimer Disease and Related Disorders*, M. Nicolini, P.F. Zatta, B. Corain eds, *Advances in the Biosciences* **87**, Pergamon Press, London, pp. 217-218.
12. Permanne B., Buée L., Hof P.R., Morrison J.H., Fillit H., Delacourte A. (1994) Les co-facteurs de l'amyloïdogenèse dans la maladie d'Alzheimer: apolipoprotéines, protéoglycannes et thrombospondines. In: *Actualités sur la Maladie d'Alzheimer et Syndromes Apparentés*, M. Poncet, B. Michel, A. Nieoullon eds, Solal, Marseilles, pp. 115-118.
13. Buée-Scherrer V., Buée L., Hof P.R., Vermersch P., Leveugle B., Wattez A., Bouras C., Perl D.P., Delacourte A. (1995) Tau variants in aging and neurodegenerative disorders. In:

Alzheimer's Disease: Lessons from Cell Biology, K.S. Kosik, Y. Christen, D.J. Selkoe eds, *Research and Perspectives in Alzheimer's Disease*, Springer, Berlin, pp. 132-149.

14. Vermersch P., Buée-Scherrer V., Buée L., David J.P., Wattez A., Sergeant N., Hof P.R., Agid Y., Perl D.P., Olanow C.W., Robitaille Y., Gauvreau D., Petit H., Delacourte A. (1997) Cortical mapping of pathological tau proteins in several neurodegenerative disorders. In: *Connections, Cognition and Alzheimer's Disease*, B.T Hyman, C. Duyckaerts, Y. Christen eds, *Research and Perspectives in Alzheimer's Disease*, Springer, Berlin, pp. 41-52.
15. Hof P.R., Nimchinsky E.A., Ungerleider L.G., Morrison J.H. (1997) Morphologic and neurochemical characteristics of corticocortical projections: emergence of circuit-specific features and relationships to degenerative changes in Alzheimer's disease. In: *Connections, Cognition and Alzheimer's Disease*, B.T Hyman, C. Duyckaerts, Y. Christen eds, *Research and Perspectives in Alzheimer's Disease*, Springer, Berlin, pp. 59-82.
16. Buée L., Hof P.R., Delacourte A. (1997) Brain microvascular changes in Alzheimer's disease and other dementias. In: *Cerebrovascular Pathology in Alzheimer's Disease*, J.C. de la Torre, V. Hachinski eds, *Ann. N.Y. Acad. Sci.* **826**, 7-24.
17. Delacourte A., Sergeant N., Robitaille Y., Buée-Scherrer V., Buée L., David J.P., Bussière T., Vermersch P., Hof P.R., Gauvreau D., Wattez A. (1997) Pathological Tau proteins are biochemical markers that differentiate several types of neurofibrillary degeneration. In: *Alzheimer's Disease: Biology, Diagnosis and Therapeutics*, K. Iqbal, B. Winblad, T. Nishimura, M. Takeda, H. Wisniewski eds, John Wiley, New York, pp. 205-212.
18. Delacourte A., Sergeant N., Robitaille Y., Buée-Scherrer V., Buée L., David J.P., Lefranc D., Vermersch P., Hof P.R., Gauvreau D., Wattez A. (1997) Neuronal subsets have different patterns of microtubule-associated tau isoforms: application to ageing, Alzheimer's disease and other diseases with neurofibrillary degeneration. In: *Biologie Prospective, Comptes-Rendus du 9ème Colloque de Pont-à-Mousson*, M.M. Galteau, P. Delwaide, G. Siest, J. Henny eds, John Libbey Eurotext, Paris, pp. 339-343.
19. Leveugle B., Spik G., Perl D.P., Bouras C., Fillit H.M., Hof P.R. (1997) Distribution of the iron-binding protein lactotransferrin in the pathologic lesions of neurodegenerative diseases. In: *Lactoferrin Structure and Function*, T.W. Hutchens, B. Lönnerdal eds, Humana Press, Totowa, pp. 119-124.
20. Morrison J.H., Nimchinsky E.A., Hof P.R. (1998) An integrative approach to quantitative neuroanatomy: from maps to cell morphology. In: *Quantitative Neuroanatomy: A Picture is Worth a Thousand Words, but a Number is Worth a Thousand Pictures*, Society for Neuroscience Short Course Syllabus, J.H. Morrison, P.R. Hof eds, Society for Neuroscience, Washington, pp. 7-19.
21. Perl D.P., Good P.F., Hof P.R. (1998) Practical approaches to stereology in the setting of a human disease-related brain bank. In: *Quantitative Neuroanatomy: A Picture is Worth a Thousand Words, but a Number is Worth a Thousand Pictures*, Society for Neuroscience Short Course Syllabus, J.H. Morrison, P.R. Hof eds, Society for Neuroscience, Washington, pp. 47-55.
22. Buée L., Mailliot C., Bussière T., Sergeant N., Buée-Scherrer V., Hof P.R., Flament S., Delacourte A. (2000) Neurodegenerative disorders with tauopathies: mad tau diseases?

- In: *Fatal Attractions: Protein Aggregates in Neurodegenerative Disorders*, V.M.Y. Lee, J.Q. Trojanowski, L. Buée, Y. Christen eds, *Research and Perspectives in Alzheimer's Disease*, Springer, Berlin, pp. 105-125.
23. Allman J.M., Hakeem A., Erwin J.M., Nimchinsky E.A., Hof P.R. (2001) The anterior cingulate cortex: the evolution of an interface between emotion and cognition. In: *Unity of Knowledge: the Convergence of Natural and Human Science*, A.R. Damasio, A. Harrington, J. Kagan, B. McEwen, H. Moss, R. Shaikh eds, *Ann. N.Y. Acad. Sci.* **935**, 107-117.
 24. Erwin J.M., Bloomsmith M., Boysen S.T., Perl D., Zihlman A., Maple T.L., Hof P.R. (2001) The great ape aging project: caring and learning from apes. In: *The Apes: Challenges for the 21st Century*, Compiled by the Brookfield Zoo, Chicago Zoological Society, Chicago, pp. 344-346.
 25. Henry B.I., Hof P.R., Rothnie P., Wearne S.L. (2001) Fractal analysis of aggregates of non-uniformly sized particles: an application to macaque monkey cortical pyramidal neurons. In: *Emergent Nature — Patterns, Growth and Scaling in the Sciences*, M.M. Nowak ed., World Scientific, Singapore, pp. 65-75.
 26. Erwin J.M., Bloomsmith M., Boysen S., Hof P.R., Holloway R., Lowenstein L., McManamon R., Perl D.P., Young W.G., Zihlman A. (2002) The Great Ape Aging Project: a resource for comparative study of behavior, cognition, health and neurobiology. In: *All Apes Great and Small, Vol. 1, Chimpanzees, Bonobos, and Gorillas*, B.M.F. Galdikas, N. Briggs, L. Sheeran, G. Shapiro, J. Goodall eds, Kluwer Academic-Plenum, New York, pp. 195-200.
 27. Perl D.P., Hof P.R., Nimchinsky E.A., Erwin J.M. (2002) Studies of age-related neuronal pathology in great apes. In: *All Apes Great and Small, Vol. 1, Chimpanzees, Bonobos, and Gorillas*, B.M.F. Galdikas, N. Briggs, L. Sheeran, G. Shapiro, J. Goodall eds, Kluwer Academic-Plenum, New York, pp. 207-216.
 28. Sherwood C.C., Holloway R.L., Gannon P.J., Semendeferi K., Erwin J.M., Zilles K., Hof P.R. (2003) Neuroanatomical basis of facial expression in monkeys, apes, and humans. In: *Emotions Inside Out 130 Years after Darwin's The Expression of the Emotions in Man and Animals*, P. Ekman, J.J. Campos, R.J. Davidson, F.B.M. de Waal eds, *Ann. N.Y. Acad. Sci.* **1000**, 99-103.
 29. Schartz A., Herrmann F.R., Bouras C., Kövari E., Gold G., Hof P.R., Giannakopoulos P. (2004) Tangle and neuron numbers, but not amyloid load, is related to cognitive decline. In: *Research and Practice in Alzheimer's Disease*, Vol. 9, B. Vellas, L.J. Fitten, B. Winblad, H. Feldman, M. Grundman, E. Giacobini, A. Kurz eds, Serdi Edition, Paris, pp. 73-77.
 30. Benveniste H., Ma Y., Dhawan J., Gifford A., Smith S.D., Feinstein I., Du C., Grant S.C., Hof P.R. (2007) Anatomical and functional phenotyping of mice models of Alzheimer's disease by MR microscopy. In: *Imaging and the Aging Brain*, M. de Leon, D.A. Snider, H. Federoff eds, *Ann. N.Y. Acad. Sci.* **1097**, 12-29.
 31. Shineman D.W., Salthouse T.A., Launer L.J., Hof P.R., Bartzokis G., Kleiman R., Luine V., Buccafusco J.J., Small G.W., Aisen P.J., Lowe D.A., Fillit H.M. (2010) Therapeutics for cognitive aging. *Ann. N.Y. Acad. Sci.* **1191**(Suppl.), E1-E10.

32. Bianchi S., Bauernfeind A.L., Gupta K., Stimpson C.D., Spoerri M.A., Bonar C.J., Manger P.R., Hof P.R., Jacobs B., Sherwood C.C. (2011) Neocortical neuron morphology in Afrotheria: comparing the rock hyrax with the African elephant. In: *New Perspectives on Neurobehavioral Evolution*, J.I. Johnson, H.P. Ziegler, P.R. Hof eds, *Ann. N.Y. Acad. Sci.* **1225**, 37-46.
33. Butti C., Raghanti M.A., Sherwood C.C., Hof P.R. (2011) The neocortex of cetaceans: cytoarchitecture and comparison with other aquatic and terrestrial species. In: *New Perspectives on Neurobehavioral Evolution*, J.I. Johnson, H.P. Ziegler, P.R. Hof eds, *Ann. N.Y. Acad. Sci.* **1225**, 47-58.
34. Allman J.M., Tetreault N.A., Hakeem A.Y., Manaye K.F., Semendeferi K., Erwin J.M., Park S., Goubert V., Hof P.R. (2011) The von Economo neurons in frontoinsular and anterior cingulate cortex. In: *New Perspectives on Neurobehavioral Evolution*, J.I. Johnson, H.P. Ziegler, P.R. Hof eds, *Ann. N.Y. Acad. Sci.* **1225**, 59-71.
35. Kövari E., Hof P.R., Bouras C. (2011) The Geneva brain collection. In: *Resources and Technological Advances for Studies of Neurobehavioral Evolution*, J.I. Johnson, H.P. Ziegler, P.R. Hof eds, *Ann. N.Y. Acad. Sci.* **1225(Suppl. 1)**, E131-E146.
36. Bianchi S., Stimpson C.D., Duka T., Larsen M.D., Janssen W.G.M., Collins Z., Bauernfeind A.L., Schapiro S.J., Baze W.B., McArthur M.J., Hopkins W.D., Wildman D.E., Lipovich L., Kuzawa C.W., Jacobs B., Hof P.R., Sherwood C.C. (2013) Sinaptogénesis y desarrollo de la morfología dendrítica de neuronas piramidales en la neocorteza del chimpancé parecidos a los de los humanos. In: *La Maquinaria Mental Humana*, J.C. Avise, F.J., Ayala, C.J. Cela Conde, R. Gutiérrez Lombardo, F. Zambrana eds, *Ludus Vitalis*, **XXI (40)**, 177-197.
37. Striedter G.F., Belgard T.G., Cardona A., Chen C.C., Chklovskii D.B., Davis, F.P., Finlay B.L., Güntürkün O., Hale M.E., Harris J.A., Heberlein U., Hecht E.E., Hof P.R., Hofmann H.A., Holland L.Z., Iwaniuk A.N., Jarvis E.D., Karten H., Katz P.S., Kristan W.B., Macagno E., Mitra P.P., Moroz L.L., Okano H., Preuss T.M., Ragsdale C.W., Sherwood C.C., Stüttgen M.C., Truman J., Tsumoto T., Wilczynski W. (2014) NSF workshop report: discovering general principles of nervous system organization by comparing brain maps across species. *Brain Behav. Evol.* **83**, 1-8; copublished in *J. Comp. Neurol.* **522**, 1445-1453.

LETTERS AND EDITORIALS

1. Mobbs C.V., Hof P.R. (1998) Preface. *Functional Endocrinology of Aging. Interdiscipl. Top. Gerontol.* Vol. 29, C.K. Cassel, J.H. Morrison Series eds, Karger, Basel, pp. vii-viii.
2. Hof P.R., Schmitz C. (2000) Current trends in neurostereology – Introduction to the special issue “Recent Advances in Neurostereology”. *J. Chem. Neuroanat.* **20**, 3-5.
3. Steinbusch H.W.M., Hof P.R., Schmitz C. (2000) Neurostereology in the Journal of Chemical Neuroanatomy. *J. Chem. Neuroanat.* **20**, 127.
4. Hof P.R., Young W.G., Bloom F.E., Belichenko P.V., Celio M.R. (2000) Introduction and methods. *Comparative Cytoarchitectonic Atlas of the C57BL/6 and 129/Sv Mouse Brains*. Elsevier, Amsterdam, pp. 1-15.

5. Hof P.R., Mobbs C.V. (2001) Preface. *Functional Neurobiology of Aging*. Academic Press, San Diego, p. xxv.
6. Schmitz C., Korr H., Perl D.P., Hof P.R. (2001) Advanced use of 3-D methods for counting neurons. *Trends Neurosci.* **24**, 376-377.
7. Erwin J.M., Hof P.R. (2002) Preface. *Aging in Nonhuman Primates. Interdiscipl. Top. Gerontol.* Vol. 31, P.R. Hof, C.V. Mobbs Series eds, Karger, Basel, pp. vii-viii.
8. Steinbusch H.W.M., Quirion R., Hof P., Reiner T. (2003) A letter from the editor and the special section editors on the occasion of the 100th issue of the Journal of Chemical Neuroanatomy. *J. Chem. Neuroanat.* **25**, 231-232.
9. Kuchel G.A., Hof P.R. (2004) Preface. *Autonomic Nervous System in Old Age. Interdiscipl. Top. Gerontol.* Vol. 33, P.R. Hof, C.V. Mobbs Series eds, Karger, Basel, pp. vii-x.
10. Cronin-Golomb A., Hof P.R. (2004) Preface. *Vision in Alzheimer's Disease. Interdiscipl. Top. Gerontol.* Vol. 34, P.R. Hof, C.V. Mobbs Series eds, Karger, Basel, pp. ix-xii.
11. Mobbs C.V., Yen K., Hof P.R. (2006) Preface. *Mechanisms of Dietary Restriction in Aging and Disease. Interdiscipl. Top. Gerontol.* Vol. 35, P.R. Hof, C.V. Mobbs Series eds, Karger, Basel, pp. vii-viii.
12. Atsalis S., Margulis S.W., Hof P.R. (2008) Introduction. *Primate Reproductive Aging: Cross-Taxon Perspectives. Interdiscipl. Top. Gerontol.* Vol. 36, P.R. Hof, C.V. Mobbs Series eds, Karger, Basel, pp. 1-3.
13. Giannakopoulos P., Hof P.R. (2009) Preface. *Dementia in Clinical Practice. Front. Neurol. Neurosci.* Vol. 24, J. Bogousslavsky Series ed., Karger, Basel pp. xi-xii.
14. Sakurai T., Buxbaum J.D., Hof P.R. (2009) Comments on Budel et al. (2008) *Genetic variants of Nogo-66 receptor with possible association to schizophrenia block myelin inhibition of axon growth (J. Neurosci. 28, 13161-13172)*. *Schizophr. Res. Forum* Jan. 9, <http://www.schizophreniaforum.org/>.
15. Hof P.R., Schmitz C. (2009) The quantitative neuropathology of schizophrenia. *Acta Neuropathol.* **117**, 345-346.
16. Hof P.R., Mobbs C.V. (2009) Preface. *Handbook of the Neuroscience of Aging*. Academic Press, London, pp. xiv-xix.
17. Hof P.R., Elder G.A. (2010) Introduction to the special issue of *Brain Structure and Function* on transgenic modeling of neurodegenerative diseases. *Brain Struct. Funct.* **214**, 89-90.
18. Hof P.R., Simic G. (2010) Message from the Editors-in-Chief. *Transl. Neurosci.* **1**, 1.
19. Mobbs C.V., Hof P.R. (2010) Preface. *Body Composition and Aging. Interdiscipl. Top. Gerontol.* Vol. 37, P.R. Hof, C.V. Mobbs Series eds, Karger, Basel, p. vi.

20. Buxbaum J.D., Hof P.R. (2011) Editorial to the special issue of *Brain Research* on the emerging neuroscience of autism spectrum disorders. *Brain Res.* **1380**, 1-2.
21. Hof P.R., Saper C.B. (2012) Passages 2012. *J. Comp. Neurol.* **520**, 1-5.
22. Hof P.R. (2012) Transition continues. *J. Comp. Neurol.* **520**, 211.
23. Buxbaum J.D., Hof P.R. (2012) Introduction. *The Neuroscience of Autism Spectrum Disorders*, J.D. Buxbaum, P.R. Hof eds, Academic Press, San Diego, pp. xi-xii.
24. Hof P.R. (2012) Introduction to Section 3, *Brain Imaging and Neuropathology of Autism Spectrum Disorders. The Neuroscience of Autism Spectrum Disorders*, J.D. Buxbaum, P.R. Hof eds, Academic Press, San Diego, pp. 249-250.
25. Hof P.R. (2013) Passages 2013. *J. Comp. Neurol.* **521**, 1-4.
26. Karten H.J., Glaser J.R., Hof P.R. (2013) An important landmark in scientific publishing. *J. Comp. Neurol.* **521**, 1697-1698.
27. Finger T.E., Yamamoto N., Karten H.J., Hof P.R. (2013) Evolution of the forebrain — Revisiting the pallium. *J. Comp. Neurol.* **521**, 3601-3603.
28. Gore A.C., Balthazart J., Bikle D., Carpenter D.O., Crews D., Czernichow P., Diamanti-Kandarakis E., Dores R.M., Grattan D., Hof P.R., Lange C., Lee A.V., Levine J.E., Millar R.P., Nelson R.J., Porta M., Poth M., Power D.M., Prins G.S., Ridgway E.C., Rissman E.F., Romijn J.S., Sawchenko P.E., Sly P.D., Söder O., Taylor H.S., Tena-Sempere M., Vaudry H., Wallen K., Wang Z., Wartkofsky L., Watson C.S. (2013) Policy decisions on endocrine disruptors should be based on science across discipline: a response to Dietrich *et al.* *Endocrinology* **154**, 3957-3960; also published in: *Eur. J. Endocrinol.* **169**, E1-E4; *Andrology* **1**, 802-805; *Horm. Res. Paediatr.* **80**, 305-308; *Front. Neuroendocrinol.* **35**, 2-5; *Horm. Behav.* **65**, 190-193.
29. Hof P.R. (2014) Passages 2014. *J. Comp. Neurol.* **522**, 1-5.
30. Bandrowski A., Tan S., Hof P.R. (2014) Promoting research resource identification at JCN. *J. Comp. Neurol.* **522**, 1707.
31. Kuzawa C.W., Chugani H.T., Grossman L.I., Lipovich L., Muzik O., Hof P.R., Wildman D.E., Sherwood C.C., Leonard W.R., Lange N. (2014) Response to Skoypes: Decline in the growth rate, not muscle mass, predicts the human childhood peak in brain metabolism. *Proc. Natl. Acad. Sci. USA* **111**, E4910.
32. Hof P.R. (2015) Passages 2015. *J. Comp. Neurol.* **523**, 1-4.

TEACHING MEDIA AND JOURNALS SPECIAL ISSUES

1. Bouras C., Giannakopoulos P., Hof P.R. (1996) Brain Aging. *Open Programs for Associative Learning (OPAL) Module n° 6*, P.J. Magistretti ed., Elsevier, Amsterdam.
2. Young W.G., Nimchinsky E.A., Hof P.R., Morrison J.H., Bloom F.E. (1997) NeuroZoom Software User Guide and Reference Books, YBM Inc., San Diego, 1038 pp. CD-ROM.

3. Hof P.R. (1997) Dementia as a neocortical disconnection syndrome: morphological and biochemical characterization of the vulnerable neurons. In: 12th Colloque Médecine et Recherche "Connections, Cognition and Alzheimer's Disease", IPSEN Foundation, Paris, 1996. On-line seminar: <http://alzforum.tvisions.com:8000/members/forums/ipsen/hof/index.html>.
4. Morrison J.H., Hof P.R. (1998) Quantitative Neuroanatomy: A Picture is Worth a Thousand Words, but a Number is Worth a Thousand Pictures. *Society for Neuroscience Short Course Syllabus*, Society for Neuroscience, Washington, viii + 78 pp.
5. Hof P.R., Schmitz C. (2000) Issue editors: *Recent Advances in Neurostereology*. *J. Chem. Neuroanat.* **20**(1) 127 pp.
6. Hof P.R. (2000) Stereology: new and powerful morphometric tools for the biologist. *Biosis Methodsfinder*, on-line editorial: <http://www.methodsfinder.com/free/news/>.
7. Hof P.R. (2007) Alzheimer's dementia: a uniquely human disease. In: *The New Comparative Biology of Human Nature*, Arthur M. Sackler Colloquia of the National Academy of Sciences, Beckman Center, Irvine, CA, 2006. CD-ROM, National Academy of Sciences, Washington, DC.
8. Hof P.R., Schmitz C. (2009) Cluster editors: *The Quantitative Neuropathology of Schizophrenia*. *Acta Neuropathol.* **117**(4), 345-427.
9. Hof P.R. (2009) Anatomy and pathology of the aging brain. In: Therapeutics for Cognitive Aging, *New York Academy of Sciences Meetings Reports and e-Briefings*. On-line lecture: <http://www.nyas.org/cognitive-aging>.
10. Hof P.R., Butti C. (2009) Von Economo (spindle) cells: larger and more numerous in human. *Museum of Comparative Anthropogeny*. <http://carta.anthropogeny.org/moca/topics/von-economo-spindle-cells>.
11. Hof P.R., Elder G.A. (2010) Issue editors: *Transgenic Modeling of Neurodegenerative Diseases*. *Brain Struct. Funct.* **214**(2-3), 213 pp.
12. Buxbaum J.D., Hof P.R. (2011) Issue editors: *The Emerging Neuroscience of Autism Spectrum Disorders*. *Brain Res.* **1380**, 270 pp.

ABSTRACTS

1. Magistretti P.J., Hof P., Schorderet M. (1983) Interactions between catecholamines and VIP in cerebral cortex and retina: effects on ³H-glycogen levels. *Prog. Neuro-Psychopharmacol. Biol. Psychiatry Suppl.*, 214.
2. Schorderet M., Ofori S., Bretton C., Hof P., Magistretti P.J. (1983) Pharmacological and physiological studies of dopamine synthesis and catabolism in rabbit retina in vitro, as measured by LC-EC. *Prog. Neuro-Psychopharmacol. Biol. Psychiatry Suppl.*, 275.
3. Ofori S., Bretton C., Hof P., Magistretti P.J., Schorderet M. (1984) Pharmacological factors affecting dopamine synthesis, storage, metabolism and release in rabbit retina in vitro: an LC-EC study. *Experientia* **40**, 648.

4. Magistretti P.J., Hof P., Schorderet M. (1984) Activation of alpha-1 adrenergic and H-1 histaminergic receptors potentiates the stimulatory effects of vasoactive intestinal peptide (VIP) on cyclic-AMP (cAMP) levels in mouse cerebral cortical slices. *Soc. Neurosci. Abstr.* **10**, 535.
5. Hof P., Magistretti P.J. (1985) ³H-glycogen hydrolysis induced by K⁺ and adenosine in mouse cerebral cortical slices: comparison with VIP and monoamines. *Experientia* **41**, 820.
6. Magistretti P.J., Hof P., Martin J.L., Celio M. (1985) ³H-glycogenolysis in the cerebral cortex: concentration-dependent effect of K⁺ and adenosine in normal mice and reduced effect of norepinephrine (NE) in the *tottering* mouse, a spontaneously epileptic mutant. *Soc. Neurosci. Abstr.* **11**, 1264.
7. Magistretti P.J., Hof P. (1986) ³H-glycogenolysis in the cerebral cortex of spontaneously epileptic mouse mutants: subsensitive glycogenolytic response to norepinephrine (NE) in the *tottering* (tg/tg) mutant and age-dependent supersensitive response to K⁺ in the *quaking* (qk/qk) mutant. *Experientia* **42**, 638.
8. Hof P.R., Magistretti P.J. (1986) Assessment of glycogen levels in superfused slices of mouse brain. *Soc. Neurosci. Abstr.* **12**, 451.
9. Martin J.L., Hof P.R., Dietl M.M., Palacios J.M., Magistretti P.J. (1986) Autoradiographic localization of (mono[¹²⁵I]iodo-Tyr¹⁰, MetO¹⁷)-vasoactive intestinal peptide (M-¹²⁵I-VIP) binding sites in the rat brain. *Soc. Neurosci. Abstr.* **12**, 812.
10. Hof P.R., Martin J.L., Magistretti P.J. (1987) Ontogeny of the glycogenolytic action of K⁺ and noradrenaline (NA) in the cerebral cortex (CC) of the epileptic mouse mutants *quaking* (qk) and *tottering* (tg) and VIP levels in the CC of tg. *Experientia* **43**, 704.
11. Magistretti P.J., Hof P.R. (1987) ³H-glycogen hydrolysis in the cerebral cortex of two spontaneously epileptic mouse mutants: noradrenergic subsensitivity in the *tottering* mouse and age-dependent supersensitive response to K⁺ in the *quaking* mouse. *Soc. Neurosci. Abstr.* **13**, 1077.
12. Hof P.R., Magistretti P.J. (1987) K⁺ at concentrations reached in the extracellular space during neuronal activity promotes a Ca⁺⁺-dependent glycogen hydrolysis in mouse cerebral cortex. *Soc. Neurosci. Abstr.* **13**, 1355.
13. Hof P.R., Magistretti P.J. (1987) ³H-glycogen hydrolysis in cerebral cortical slices prepared from spontaneously epileptic mouse mutants: noradrenergic subsensitivity in the *tottering* mouse and supersensitive response to K⁺ in the *quaking* mouse. *Neuroscience* **22** (suppl.), S70.
14. Martin J.L., Dietl M.M., Hof P.R., Palacios J.M., Magistretti P.J. (1987) Autoradiographic mapping of M-¹²⁵I-VIP binding sites in the vertebrate CNS. *Neuroscience* **22** (suppl.), S302.
15. Magistretti P.J., Hof P.R. (1988) Altered regulation of glycogen metabolism by vasoactive intestinal peptide (VIP) and K⁺ in the neocortex of the spontaneously epileptic mouse mutant *quaking*. *Soc. Neurosci. Abstr.* **14**, 147.

16. Morrison J.H., Cox K., Hof P.R., Celio M.R. (1988) Neocortical parvalbumin-containing neurons are resistant to degeneration in Alzheimer's disease. *Soc. Neurosci. Abstr.* **14**, 1085.
17. Hof P.R., Cox K., Morrison J.H. (1988) Quantitative analysis of non-phosphorylated neurofilament protein (NPNFP)-immunoreactive neurons in normal and Alzheimer's disease brain. *Soc. Neurosci. Abstr.* **14**, 1086
18. Magistretti P.J., Hof P.R., Martin J.L., Stoyanov T. (1988) VIP neurons and their role in local cortical energy metabolism. *Psychopharmacology* **96** (Suppl.), 94.
19. Hof P.R., Magistretti P.J. (1988) Altered regulation of the glycogenolysis elicited by K⁺ in the neocortex of the spontaneously epileptic *quaking* mutant. *Eur. J. Neurosci. Suppl.* **1**, 97.
20. Hof P.R., Morrison J.H., Bouras C., Constantinidis J. (1989) Balint's syndrome in Alzheimer's disease: specific disconnection of the occipito-parietal component of the visual system. *Ann. Neurol.* **26**, 137.
21. Campbell M.J., Hof P.R., Cox K., Kimber T.A., Young W.G., Morrison J.H. (1989) A subset of primate corticocortical neurons are neurofilament protein (NFP) immunoreactive (ir): a combined retrograde immunohistochemical study. *Soc. Neurosci. Abstr.* **15**, 72.
22. Bouras C., Hof P.R., Vallet P.G., Tagliavini F., Charnay Y., Constantinidis J. (1989) Immunohistochemical study of substance P (SP) after unilateral frontal lobectomy in the human brain. *Soc. Neurosci. Abstr.* **15**, 861.
23. Guntern R., Bouras C., Hof P.R. (1989) An improved staining method for senile plaques and neurofibrillary tangles in Alzheimer's disease: quantitative comparison with other techniques. *Soc. Neurosci. Abstr.* **15**, 1038.
24. Hof P.R., Bouras C., Constantinidis J., Morrison J.H. (1989) Selective disconnection of specific visual pathways in cases of Alzheimer's disease combined with Balint's syndrome. *Soc. Neurosci. Abstr.* **15**, 1042.
25. Blümcke I., Hof P.R., Morrison J.H., Celio M.R. (1989) The calcium-binding protein parvalbumin in the striate cortex of macaque monkeys and humans. *Soc. Neurosci. Abstr.* **15**, 1398.
26. Morrison J.H., Hof P.R., Janssen W., Bassett J.L., Foote S.L., Kraemer G.W., McKinney W.T. (1990) Quantitative neuroanatomic analysis of cerebral cortex in rhesus monkeys from different rearing conditions. *Soc. Neurosci. Abstr.* **16**, 789.
27. Hof P.R., Perl D.P., Steele J.C., Janssen W., Morrison J.H. (1990) Quantitative neuropathologic analysis of ALS-PD cases from Guam. *Soc. Neurosci. Abstr.* **16**, 1264.
28. Bouras C., Hof P.R., Guntern R., Morrison J.H. (1990) Down's syndrome (DS), dementia pugilistica (DP), and Alzheimer's disease (AD): a quantitative neuropathologic comparison. *Soc. Neurosci. Abstr.* **16**, 1264.

29. Bouras C., Vallet P.G., Charnay Y., Golaz J., Hof P.R. (1990) Asymmetric distribution of substance P (SP) immunoreactive profiles in the substantia nigra of Pick's disease brains. *Eur. J. Neurosci. Suppl.* **3**, 74.
30. Hof P.R., Bouras C., Constantinidis J., Morrison J.H. (1990) Selective disconnection of specific visual association pathways in cases of Alzheimer's disease presenting with Balint's syndrome. *Parkinson/Alzheimer Digest* **6**, 25-28.
31. Hof P.R., Perl D.P., Steele J.C., Janssen W., Archin N., Purohit D., Morrison J.H. (1991) Lytic-bodig of Guam: a morphometric study. *J. Neuropathol. Exp. Neurol.* **50**, 306.
32. Knabe R., Bouras C., Hof P.R., Bovier P. (1991) Chronic self-injurious behavior in autism: neuropathological findings. *Biol. Psychiatry* **29**, 525S.
33. Bouras C., Vallet P.G., Hof P.R. (1991) Asymmetric substance P distribution in the rat and guinea pig substantia nigra after unilateral neocortical ablation. *Biol. Psychiatry* **29**, 532S.
34. Buée L., Hof P.R., Delacourte A., Perl D.P., Morrison J.H., Fillit H. (1991) Immunohistochemical analysis of vascular heparan sulfate proteoglycan (vHSPG) protein core distribution in aging and dementia. *IBRO Abstr.*, 90.
35. Good P.F., Hof P.R., Morrison J.H. (1991) Morphology of neurons in the entorhinal cortex that project to neocortex in the rat and monkey. *Soc. Neurosci. Abstr.* **17**, 134.
36. Fillit H.M., Buée L., Hof P.R., Delacourte A., Morrison J.H. (1991) Cortical distribution of abnormal microvasculature and vascular heparan sulfate proteoglycan positive plaques in Alzheimer's disease (AD). *Soc. Neurosci. Abstr.* **17**, 692.
37. Hof P.R., Hsu P., Morrison J.H. (1991) Quantitative chemoarchitectonic analysis of the cingulate cortex in Alzheimer's disease (AD). *Soc. Neurosci. Abstr.* **17**, 693.
38. Bouras C., Hof P.R., Good P.F., Hsu A., Perl D.P. (1991) Laser microprobe mass analysis of aluminum, copper and zinc in different neurodegenerative disorders. *Soc. Neurosci. Abstr.* **17**, 695.
39. Kupferschmid S.B., Hof P.R., Morrison J.H. (1991) Corticocortical connections in macaque visual cortex exhibit differential patterns of neurofilament protein distribution. *Soc. Neurosci. Abstr.* **17**, 845.
40. Glezer I.I., Hof P.R., Janssen W., Morrison J.H., Leranth C., Morgane P.J. (1991) Comparative immunohistochemistry of cytoskeletal proteins in visual cortex of cetaceans and primates. *Soc. Neurosci. Abstr.* **17**, 846.
41. Ginsberg S.D., Hof P.R., Young W.G., Kraemer G.W., McKinney W.T., Morrison J.H. (1991) Quantitative analysis of transmitter-identified systems in the monkey paraventricular nucleus: effects of differential rearing conditions. *Soc. Neurosci. Abstr.* **17**, 895.
42. Siegel S.J., Hof P.R., Young W.G., Kraemer G.W., McKinney W.T., Morrison J.H. (1991) Effects of maternal deprivation on neuronal populations in the primate hippocampus. *Soc. Neurosci. Abstr.* **17**, 895.

43. Morrison J.H., Hof P.R., Kupferschmid S.B., Good P.F., Janssen W., Archin N. (1991) Relationships between connectivity and cytoskeletal profile of corticocortically-projecting neurons. *Soc. Neurosci. Abstr.* **17**, 1021.
44. Sealfon S.C., Janssen W.G., Snyder L.A., Huntley G.W., Schiffman Y., Hof P.R., Prikhozhan A., Morrison J.H. (1991) Laminar distribution of dopamine receptor subtypes in the macaque anterior cingulate cortex. *Soc. Neurosci. Abstr.* **17**, 1347.
45. Ginsberg S.D., Siegel S.J., Hof P.R., Young W.G., Kraemer G.W., McKinney W.T., Morrison J.H. (1992) Effects of social isolation on specific neuronal populations in the primate hypothalamus and hippocampus. *Biol. Psychiatry* **31**, 196A.
46. Nimchinsky E.A., Hof P.R., Nasrallah J., Perl D.P., Steele J.C., Purohit D., Delacourte A., Morrison J.H. (1992) Chemoarchitecture of the cerebral cortex in Guam ALS/parkinsonism-dementia (ALS/PD): comparison with Alzheimer's disease (AD). *J. Neuropathol. Exp. Neurol.* **51**, 323.
47. Buée L., Hof P.R., Nimchinsky E., Nasrallah J., Steele J.C., Delacourte A., Perl D.P., Morrison J.H., Fillit H.M. (1992) Microvasculature in Guam ALS/PD cases. *J. Neuropathol. Exp. Neurol.* **51**, 323.
48. Bouras C., Giannakopoulos P., Hof P.R., Robakis N.K., Delacourte A., Surini M., Michel J.P. (1992) Neuropathological study of 21 centenarians. *Neurobiol. Aging* **13 Suppl. 1**, S39.
49. Buée L., Hof P.R., Delacourte A., Morrison J.H., Fillit H.M. (1992) Characterization of vascular and neuronal heparan sulfate proteoglycan that binds to amyloid β protein. *Neurobiol. Aging* **13 Suppl. 1**, S82.
50. Siegel S.J., Hof P.R., Kraemer G.W., McKinney W.T., Morrison J.H. (1992) Effects of postnatal mossy fiber development on CA3 apical dendrites in differentially reared monkeys. *Soc. Neurosci. Abstr.* **18**, 34.
51. Blümcke I., Hof P.R., Lüth H.J., Celio M.R. (1992) The calcium binding protein (CaPBs), parvalbumin, calbindin D-28k, and calretinin define cytoarchitectural features of the monkey occipital cortex. *Soc. Neurosci. Abstr.* **18**, 298.
52. Glezer I.I., Hof P.R., Morgane P.J. (1992) Calcium-binding proteins define specific cortical and subcortical components of the dolphin visual system. *Soc. Neurosci. Abstr.* **18**, 390.
53. Nimchinsky E.A., Hof P.R., Perl D.P., Morrison J.H. (1992) The frontal cortex in neurodegenerative disorders: cellular and regional patterns of vulnerability. *Soc. Neurosci. Abstr.* **18**, 557.
54. Bouras C., Giannakopoulos P., Hof P.R., Robakis N.K., Surini M., Michel J.P. (1992) Distribution of neurofibrillary tangles and amyloid deposits in the hippocampus and the temporal neocortex: a study of one year autopsy population from a geriatric hospital. *Soc. Neurosci. Abstr.* **18**, 565.
55. Buée L., Hof P.R., Delacourte A., Surini M., Bouras C. (1992) Laminar and regional distribution of neurofibrillary tangles and Pick bodies in Pick's disease: comparison with Alzheimer's disease. *Soc. Neurosci. Abstr.* **18**, 566.

56. Ginsberg S.D., Hof P.R., Young W.G., Morrison J.H. (1992) Quantification of noradrenergic varicosities in apposition to vasopressin-immunoreactive neurons in the monkey paraventricular nucleus. *Soc. Neurosci. Abstr.* **18**, 1415.
57. Hof P.R., Mufson E.J., Archin N., Edwards A., Janssen W.G., Morrison J.H. (1992) Anatomic organization of the human orbitofrontal cortex. *Soc. Neurosci. Abstr.* **18**, 1418.
58. Vogt B.A., Nimchinsky E.A., Hof P.R., Morrison J.H. (1992) Chemoarchitecture of the monkey and human cingulate cortex. *Soc. Neurosci. Abstr.* **18**, 1419.
59. Perl D.P., Purohit D.P., Hof P.R., Haroutunian V., Davidson M.L., Davis K.L. (1993) Neuronal perikaryal contribution to the development of the neuritic plaque: evaluation through the examination of prefrontal cortex in elderly schizophrenics who underwent prefrontal leukotomy. *J. Neuropathol. Exp. Neurol.* **53**, 334.
60. Bierer L.M., Hof P.R., Purohit D., Carlin L., Perl D.P. (1993) Neocortical neurofibrillary tangles correlate with dementia severity in Alzheimer's disease. *Soc. Neurosci. Abstr.* **19**, 193.
61. Buée-Scherrer V., Buée L., Vermersch P., Hof P.R., Leveugle B., Loerzel A., Steele J.C., Delacourte A., Perl D.P. (1993) Biochemical characterization of the tau proteins in amyotrophic lateral sclerosis/parkinsonism dementia complex (ALS/PDC) of Guam. *Soc. Neurosci. Abstr.* **19**, 195.
62. Hof P.R., Archin N., Edwards A.M., Mehta N., Janssen W.G., Morrison J.H. (1993) Neurofilament protein defines cytoarchitectonic fields in the monkey visual cortex. *Soc. Neurosci. Abstr.* **19**, 332.
63. Glezer I.I., Hof P.R., Morgane P.J., Kaplan A., Yang S. (1993) Comparative analysis of calcium-binding protein-positive neurons in auditory and visual systems in cetacean and primate brains. *Soc. Neurosci. Abstr.* **19**, 333.
64. Nimchinsky E.A., Hof P.R., Brose N., Rogers S.W., Moran T., Gasic G.P., Heinemann S., Morrison J.H. (1993) Glutamate receptor subunit and neurofilament protein immunoreactivities differentiate subsets of corticocortically projecting neurons in the monkey cingulate cortex. *Soc. Neurosci. Abstr.* **19**, 473.
65. Bouras C., Giannakopoulos P., Surini M., Michel J.P., Richard J., Hof P.R. (1993) Quantitative analysis of neuropathologic changes in the cerebral cortex of centenarians. *Soc. Neurosci. Abstr.* **19**, 1044.
66. Buée L., Bouras C., Hof P.R., Surini M., Morrison J.H., Fillit H.M., Delacourte A. (1993) A qualitative and quantitative immunohistochemical study of the microvasculature in aging and Alzheimer's disease. *Soc. Neurosci. Abstr.* **19**, 1045.
67. Vogt B.A., Nimchinsky E.A., Morrison J.H., Hof P.R. (1993) Calretinin may define thalamocortical connections between human limbic thalamus and cingulate cortex. *Soc. Neurosci. Abstr.* **19**, 1445.
68. Buée L., Hof P.R., Bouras C., Perl D.P., Morrison J.H., Fillit, H.M., Delacourte A. (1993) Microvascularisation dans la maladie d'Alzheimer et les démences. *Bull. Anat.* **77**, 39.

69. Hof P.R., Ungerleider L.G., Webster M.J., Adams M., Morrison J.H. (1994) Neurofilament protein and glutamate receptor subunit proteins define subsets of corticocortical projections in the monkey visual cortex. *Invest. Ophthalmol. Vis. Sci.* **35**, 1971.
70. Leveugle B., Fillit H.M., Spik G., Perl D.P., Bouras C., Hof P.R. (1994) Distribution of the iron-binding protein lactotransferrin in the pathological lesions of a variety of neurodegenerative disorders. *Neurobiol. Aging* **15 Suppl. 1**, S126.
71. Perl D.P., Hof P.R., Purohit D.P., Loerzel A., Belli D. (1994) Temporal changes in the outbreak of amyotrophic lateral sclerosis/parkinsonism-dementia complex, evaluation of Guamanian Chamorro controls. *Neurobiol. Aging* **15 Suppl. 1**, S153.
72. Jaeger D.A., Hof P.R., Sealfon S.C. (1994) Patterns of c-fos induction by cocaine and amphetamine in the striatum and olfactory tubercle of rat. *Soc. Neurosci. Abstr.* **20**, 595.
73. Istomin V.V., Marx J.K., Hof P.R. (1994) "Morphoqwin" for Quantimet-570: software interface for automatic morphometry of neocortex. *Soc. Neurosci. Abstr.* **20**, 702.
74. Nimchinsky E.A., Hof P.R., Schmauss C., Levey A.I., Tullai J.W., Moran T., Sealfon S.C., Morrison J.H. (1994) Dopamine D3 receptor (D3R) immunoreactivity shows distinct regional and laminar patterns in monkey cortex. *Soc. Neurosci. Abstr.* **20**, 911.
75. Charnay Y., Léger L., Vallet P.G., Hof P.R., Bouras C. (1994) Autoradiographic analysis of noradrenaline uptake binding sites in the cat brain using [³H]-nisoxetine. *Soc. Neurosci. Abstr.* **20**, 924.
76. Leveugle B., Yang C., Eisler J., Bouras C., Hof P.R., Fillit H.M. (1994) Microvascular pathologic changes in hippocampal formation in Alzheimer's disease. *Soc. Neurosci. Abstr.* **20**, 1033.
77. Bouras C., Hof P.R., Miklóssy J., Celio M.R. (1994) "Perineuronal nets of extracellular matrix" around nerve cells in various neuropsychiatric disorders. *Soc. Neurosci. Abstr.* **20**, 1261.
78. Buée-Scherrer V., Buée L., Vermersch P., Hof P.R., Leveugle B., Perl D.P., Delacourte A. (1994) Tau pathology in neurodegenerative disorders: biochemical analysis. *Soc. Neurosci. Abstr.* **20**, 1647.
79. Vermersch P., Buée-Scherrer V., Buée L., Hof P.R., Perl D., Gauvreau D., Destée A., Petit H., Delacourte A. (1994) Biochemical mapping of neurofibrillary pathology in progressive supranuclear palsy: evidence for a severe cortical involvement. *Soc. Neurosci. Abstr.* **20**, 1647.
80. Perl D.P., Hof P.R., Steele J.C., Purohit D.P., Esteban-Santillan C., Peterson R., Kurland L.T. (1994) Marianas dementia, a purely dementing form of ALS/parkinsonism dementia complex of Guam. *Soc. Neurosci. Abstr.* **20**, 1649.
81. Hof P.R., Sailstad C.A., Archin N., Edwards A.M., Janssen W.G.M., Morrison J.H. (1994) Distribution of the calcium-binding proteins parvalbumin, calbindin and calretinin in the macaque monkey visual cortex. *Soc. Neurosci. Abstr.* **20**, 1740.

82. Perl D.P., Hof P.R., Steele J.C., Purohit D.P., Peterson R., Kurland L.T. (1994) Neuropathologic studies of a pure dementing syndrome (Marianas dementia) among the inhabitants of Guam, a form of ALS/parkinsonism-dementia complex. *Brain Pathol.* **4**, 529.
83. Hof P.R., Wang R.F., Sailstad C.A., Schumer R.A., Podos S.M., Morrison J.H. (1995) Quantitative analysis of vulnerable subsets of thalamic and tectal neurons in experimental glaucoma. *Invest. Ophthalmol. Vis. Sci.* **36**, S964.
84. Glezer I.I., Hof P.R., Morgane P.J. (1995) Cytoarchitecture and immunocytochemistry of the inferior colliculus of midbrain in cetaceans. *FASEB J.* **9**, A247.
85. Perl D.P., Hof P.R., Purohit D.P., Loerzel A.F., Belli D. (1995) Changes in the outbreak of ALS/parkinsonism-dementia complex: neuropathologic studies of asymptomatic Chamorros. *J. Neuropathol. Exp. Neurol.* **54**, 416.
86. Bogaert Y.E., Hof P.R., Morrison J.H., Rex-Sheu K.F., Rosenthal R.E., Fiskum G. (1995) Brain pyruvate dehydrogenase (PDH) following cardiac arrest and resuscitation. *Soc. Neurosci. Abstr.* **21**, 211.
87. Nimchinsky E.A., Hof P.R., Young W.G., Morrison J.H. (1995) Neurochemical and morphologic features of projection neurons in the cingulate motor areas of the macaque monkey. *Soc. Neurosci. Abstr.* **21**, 410.
88. Glezer I.I., Hof P.R., Ackerman A.I., Tsai F., Morgane P.J. (1995) Immunocytochemistry and cytoarchitecture of the hippocampal formation in whales: comparative analyses. *Soc. Neurosci. Abstr.* **21**, 429.
89. Perl D.P., Hof P.R., Purohit D.P., Loerzel A.J. (1995) Neuroanatomic analysis of brains from asymptomatic Chamorros reveals changes in the pattern of Guamanian ALS/PD complex. *Soc. Neurosci. Abstr.* **21**, 492.
90. Morrison J.H., Podos S.M., Vickers J.C., Wang R.F., Schumer R.A., Sailstad C.A., Hof P.R. (1995) Selective vulnerability of subsets of neurons in subcortical structures of monkeys with experimental glaucoma. *Soc. Neurosci. Abstr.* **21**, 658.
91. Webster M.J., Morrison J.H., Edwards A.M., Hof P.R. (1995) Postnatal development of parvalbumin, calbindin, calretinin and neurofilament protein immunoreactive neurons in inferior temporal cortex of monkey. *Soc. Neurosci. Abstr.* **21**, 660.
92. Adams M.M., Webster M.J., Gattass R., Hof P.R., Ungerleider L.G. (1995) Inputs to visual areas V1, V2, and MT from the macaque pulvinar and their relationships to chemoarchitectonic subdivisions. *Soc. Neurosci. Abstr.* **21**, 904.
93. Hof P.R., Ungerleider L.G., Webster M.J., Gattass R., Adams M.M., Sailstad C.A., Janssen W.G.M., Morrison J.H. (1995) Feedforward and feedback corticocortical projections in the monkey visual system display differential neurochemical phenotype. *Soc. Neurosci. Abstr.* **21**, 904.
94. Morrison B.M., Gordon J.W., Hof P.R., Ripps M.E., Morrison J.H. (1995) Immunohistochemical characterization of degenerative neurons in the spinal cord of mutant superoxide dismutase transgenic mice. *Soc. Neurosci. Abstr.* **21**, 980.

95. Young W.G., Nimchinsky E.A., Hof P.R., Bloom F.E., Morrison J.H. (1995) NeuroZoom: computer software for quantitative neuroanatomic mapping and stereology. *Soc. Neurosci. Abstr.* **21**, 1078.
96. Hof P.R., Lee P.Y., Podos S.M., Janssen W.G.M., Morrison J.H. (1996) Cellular distribution of NMDA and non-NMDA glutamate receptor subunits in the macaque monkey retina. *Invest. Ophthalmol. Vis. Sci.* **37**, S628.
97. Perl D.P., Purohit D.P., Barodawala S.S., Hof P.R. (1996) Neuropathologic evidence for the existence of Alzheimer's disease in an urban population of Bombay, India. *J. Neuropathol. Exp. Neurol.* **55**, 617.
98. Hof P.R., Buée-Scherrer V., Buée L., Perl D.P., Delacourte A. (1996) Immunohistochemical and biochemical characteristics of tau proteins in neurodegenerative disorders. *J. Neuropathol. Exp. Neurol.* **55**, 635.
99. Giannakopoulos P., Hof P.R., Kövari E., Vallet P.G., Perl D.P., Bouras C. (1996) Characteristics of Alzheimer's disease pathologic changes in the oldest-old. *Soc. Neurosci. Abstr.* **22**, 211.
100. Morgane P.J., Glezer I.I., Hof P.R., Vavasis C., Ioannou J., David L. (1996) Cytoarchitecture and immunohistochemistry of calcium-binding protein-positive neurons in hippocampus formation of whales and terrestrial mammals. *Soc. Neurosci. Abstr.* **22**, 901.
101. Hof P.R., Bogaert Y.E., Rosenthal R.E., Fiskum G. (1996) Glutamate receptors, neurofilament and calcium-binding proteins distribution in the dog hippocampus and neocortex. *Soc. Neurosci. Abstr.* **22**, 936.
102. Adams M.M., Ungerleider L.G., Eden G., Bouras C., Bertini G., Morrison J.H., Hof P.R. (1996) Neurofilament and calcium-binding proteins define visual cortical areas in human. *Soc. Neurosci. Abstr.* **22**, 1059.
103. Gattass R., Adams M.M., Hof P.R., Ungerleider L.G. (1996) Parcellation of visual cortical areas in the chimpanzee using neurofilament and calcium-binding proteins. *Soc. Neurosci. Abstr.* **22**, 1059.
104. Glezer I.I., Hof P.R., Meyer G., Morgane P.J. (1996) Comparative analysis of calcium-binding protein-positive neuronal populations in visual and auditory systems of cetacean, ungulate, carnivore and primate brains. *Soc. Neurosci. Abstr.* **22**, 1070.
105. Young W.G., Morrison J.H., Hof P.R., Nimchinsky E.A., Bloom F.E. (1996) NeuroZoom — Topographical mapping and stereological counting, distribution of data, and collaborative computing. *Soc. Neurosci. Abstr.* **22**, 1238.
106. Nimchinsky E.A., Vickers J.C., Young W.G., Schumer R.A., Wang R.F., Podos S.M., Morrison J.H., Hof P.R. (1996) An optical fractionator analysis of neuronal changes in the lateral geniculate nucleus of monkeys with experimental glaucoma. *Soc. Neurosci. Abstr.* **22**, 1607.

107. Bouras C., Giannakopoulos P., Kövari E., Hof P.R., Vallet P.G., Shioi J., Tezapsidis N., Robakis N.K. (1996) Quantitative analysis of presenilin-1 in the brain of elderly people. *Soc. Neurosci. Abstr.* **22**, 1661.
108. Buée L., Hof P.R., Rosenthal R.E., Delacourte A., Fiskum G. (1996) Tau proteins phosphorylation and proteolysis in a canine model of cerebral ischemia/reperfusion. *Soc. Neurosci. Abstr.* **22**, 1897.
109. Morrison J.H., Vissavajjhala P., Blumberg D.M., Hu Y., Janssen W.G.M., Hof P.R. (1996) Calcium-binding proteins parvalbumin, calbindin and calretinin display differential colocalization patterns with glutamate receptor subunit protein GluR2 in macaque monkey area V1. *Soc. Neurosci. Abstr.* **22**, 1994.
110. Delacourte A., Robitaille Y., Hof P.R., Vermersch P., Sergeant N., Buée L., Buée-Scherrer V., Gauvreau D., Wattez A. (1996) Pick's disease: a specific pattern of pathological tau (tau 55 and 64) is present in many cortical and subcortical brain areas. *Soc. Neurosci. Abstr.* **22**, 2140.
111. Bogaert Y.E., Levesque A., Hof P., Haywood Y., Rosenthal R.E., Fiskum G. (1996) Postischemic ventilatory O₂ influences neurological, histological and neurochemical outcome following canine cardiac arrest. *Soc. Neurosci. Abstr.* **22**, 2148.
112. Buée L., Buée-Scherrer V., Sergeant N., Wattez A., Vermersch P., Robitaille Y., Gauvreau D., Hof P.R., Delacourte A. (1996) Tau proteins and phosphorylation in brain disorders. *Eur. J. Neurosci.* **8** (Suppl.), 647.
113. Hof P.R. (1997) Differential diagnosis of Alzheimer's disease: neuropathological aspects. *Eur. Psychiatry* **12** (Suppl. 2), 103s.
114. Erwin J., Perl D., Hof P., Boysen S., Reite M. (1997) A comparative neurobiology of aging resource: feasibility and progress report on development of a great ape brain bank. *Am. J. Primatol.* **42**, 108-109.
115. Hof P.R., Bussière T., Soulié C., Brown, C., Perl D.P., Delacourte A. (1997) Serine 422 phosphorylation of tau proteins in neurodegenerative disorders. *Brain Pathol.* **7**, 1109.
116. Nimchinsky E.A., Hof P.R., Young W.G., Bloom F.E., Morrison J.H. (1997) Stereology using NeuroZoom software: development, validation, and neurobiological applications. *Soc. Neurosci. Abstr.* **23**, 643.
117. Glezer I.I., Morgane P.J., Hof P.R., Andrews J., Chang J., Ioannou J., Iype J., Joseph D., Jung G., Kouloris M., Parhar P., Vavasis C. (1997) Three calcium-binding proteins in primary motor and visual cortices of cetacean and primate brains: comparative immunocytochemical analysis. *Soc. Neurosci. Abstr.* **23**, 1272.
118. Giannakopoulos P., Kövari E., Hof P.R., French L.E., Bouras C. (1997) Evidence for clusterin-mediated neuroprotection in Alzheimer's disease: a quantitative immunocytochemical study. *Soc. Neurosci. Abstr.* **23**, 1642.
119. Sergeant N., Robitaille Y., Vermersch P., Buée L., Buée-Scherrer V., Wattez A., Tranchant C., Gauvreau C., Hof P.R., Delacourte A. (1997) Pathological tau proteins distinguish six subtypes of neurofibrillary degeneration. *Soc. Neurosci. Abstr.* **23**, 1644.

120. Perl D.P., Soulié C., Bussière T., Brown C., Vallotton T., Hof P., Delacourte A. (1997) Presence of phosphorylated serine 422 on tau proteins is a common feature among neurodegenerative disorders. *Soc. Neurosci. Abstr.* **23**, 1644.
121. Savioz A., Giannakopoulos P., Kövari E., Hof P.R., Efthimiopoulos S., Robakis N.K., Bouras C., Shioi J. (1997) Distribution of presenilins 1 and 2 in the cerebral cortex of Pick's disease cases. *Soc. Neurosci. Abstr.* **23**, 1650.
122. Pietrini P., Hof P., Graff-Radford N.R., Furey M.L., Alexander G.E., Mentis M.J., Nichelli P., Dani A., Brown C.A., Schapiro M.B. (1997) Altered regional distribution of brain metabolic and pathological lesions in the visual variant of Alzheimer disease (AD). *Soc. Neurosci. Abstr.* **23**, 2170.
123. Krajewska M., Krajewski S., Hof P.R., Rosenthal R.E., Miljkovic-Lolic M., Reed J.C., Fiskum G. (1997) Expression of pro- and anti-apoptosis gene products (Bax, Bcl-2, Bcl-X, BAK and caspase-3 proteins) in canine global brain ischemia. *Soc. Neurosci. Abstr.* **23**, 2177.
124. Hof P.R., Nimchinsky E.A., Young W.G., Morrison J.H. (1997) Stereologic analysis of the primary visual cortex in aged macaque monkeys. *Soc. Neurosci. Abstr.* **23**, 2363.
125. Delacourte A., Sergeant N., Robitaille Y., Vermersch P., Buée L., Buée-Scherrer V., Wattez, A., Tranchant C., Gauvreau D., Hof P.R. (1997) Biochemical diagnosis of Alzheimer's disease: pathological tau proteins distinguish six subtypes of neurofibrillary neurodegeneration. *Neurobiol. Aging* **18**, 682.
126. Hof P.R., Nimchinsky E.A., Perl D.P., Erwin J.M. (1998) Identification of neuronal types unique to hominoids in anterior cingulate cortex. *FASEB J.* **12**, A234.
127. Nimchinsky E.A., Hof P.R., Young W.G., Bloom F.E., Morrison J.H. (1998) NeuroZoom software: development, validation, and neurobiological application. *FASEB J.* **12**, A628.
128. Morrison J.H., Hof P.R. (1998) Neuronal vulnerability and degeneration — Life and death in the aging brain. *FASEB J.* **12**, A944.
129. Erwin J., Bloomsmith M., Boysen S., Hof P., Holloway R., Lowenstein L., McManamon R., Nimchinsky E., Perl D., Reite M., Young W., Zihlman A. (1998) Development of a comparative neurobiology of aging resource: progress during year one of the great ape aging project. *Am. J. Primatol.* **45**, 179.
130. Hof P.R., Nimchinsky E.A., Perl D.P., Erwin J. (1998) Identification of neural types in cingulate cortex that are unique to humans and great apes. *Am. J. Primatol.* **45**, 184-185.
131. Giannakopoulos P., Gold G., Duc M., Michel J.P., Hof P., Bouras C. (1998) Visual agnosia in Alzheimer's disease. *Eur J. Neurosci.* **10** (Suppl.), 91.
132. Giannakopoulos P., Hof P.R., Kövari E., Surini M., Bouras C. (1998) Normal aging: the centenarian brain. *Neurobiol. Aging* **19** (Suppl.), S3.

133. Morrison J.H., He Y., Yeung G., Nimchinsky E.A., Janssen W.G.M., Hof P.R. (1998) Quantitative analysis of neurofilament protein, GluR2, and NMDAR1 in corticocortical projections in macaque monkeys. *Soc. Neurosci. Abstr.* **24**, 91.
134. Gannon P.J., Broadfield D.C., Kheck N.M., Hof P.R., Braun A.R., Erwin J.M., Holloway R.L. (1998) Brain language area evolution I: Anatomic expression of Heschl's gyrus and planum temporale asymmetry in great apes, lesser apes and Old World monkeys. *Soc. Neurosci. Abstr.* **24**, 160.
135. Kheck N.M., Gannon P.J., Hof P.R., Braun A.R., Erwin J.M., Broadfield D.C., Yuan M., Holloway R.L. (1998) Brain language area evolution II: Human-like pattern of hemispheric asymmetry in planum parietale of chimpanzees. *Soc. Neurosci. Abstr.* **24**, 160.
136. Hof P.R., Nimchinsky E.A., Allman J.M., Gilissen E., Robinzadeh F., Gimmel D., Perl P.D., Erwin J.M. (1998) Neuronal classes unique to the anterior cingulate cortex of hominoids. *Soc. Neurosci. Abstr.* **24**, 160.
137. Giannakopoulos P., Gold G., Duc M., Michel J.P., Hof P.R., Bouras C. (1998) Neuroanatomical correlates of visual agnosia in Alzheimer's disease: a clinicopathological study. *Soc. Neurosci. Abstr.* **24**, 211.
138. Vissavajjhala P., Hof P.R., Moran T., He Y., Gimmel D., Morrison J.H. (1998) Characterization of human NMDA receptor 2A and 2B monoclonal antibodies. *Soc. Neurosci. Abstr.* **24**, 339.
139. Savioz A., Giannakopoulos P., Kövári E., Robakis N.K., Buée L., Hof P.R., Bouras C. (1998) Presenilin-1, BAX and BCL-XL distribution in Alzheimer's disease and frontotemporal dementia. *Soc. Neurosci. Abstr.* **24**, 473.
140. Gimmel D., Morrison J.H., Perl D.P., Bouras C., Hof P.R. (1998) Development of stereologic indices of neurodegeneration in the cerebral cortex during normal aging and Alzheimer's disease. *Soc. Neurosci. Abstr.* **24**, 960.
141. Perl D.P., Good P.F., Bouras C., Morrison J.H., Hof P.R. (1998) A practical approach to preparing samples for stereologic analysis in the setting of a human brain bank. *Soc. Neurosci. Abstr.* **24**, 960.
142. Vogt B.A., Vogt L.J., Vrana K.E., Gioia L., Meadows R.S., Challa V.R., Hof P.R., Van Hoesen G.W. (1998) Multivariate model of cingulate neurons shows pathological subtypes within Alzheimer's disease. *Soc. Neurosci. Abstr.* **24**, 961.
143. Celio M.R., Hof P.R., Bloom F.E., Young W.G. (1998) A computerized stereotaxic atlas of the mouse brain. *Soc. Neurosci. Abstr.* **24**, 1065.
144. Peralta III M.R., Hof P.R., Petit L., Ungerleider L.G. (1998) Localization and chemoarchitecture of the human frontal eye field. *Soc. Neurosci. Abstr.* **24**, 1147.
145. Nimchinsky E.A., Hof P.R., Shah R.A., Yeung G., Young W.G., Bloom F.E., Morrison J.H. (1998) Stereologic analysis of brainstem motor nuclei in an SOD1 mutant mouse model of amyotrophic lateral sclerosis. *Soc. Neurosci. Abstr.* **24**, 1203.

146. Chu Y.P., Ma S., Morrison J., Hof P., Mufson E.J., Kordower J.H. (1998) The effects of ovariectomy on cholinergic basal forebrain neurons in nonhuman primates: preliminary observations. *Soc. Neurosci. Abstr.* **24**, 1474.
147. Bouras C., Gold G., Kövári E., Malky H., Hof P.R., Michel J.P., Giannakopoulos P. (1998) Clinical correlates of Braak's neuropathological staging of Alzheimer's disease. *Soc. Neurosci. Abstr.* **24**, 1496.
148. Glezer I.I., Hof P.R., Morgane P.J., Josef D., Isakova T., Nair A., Parhar P., Thengampal A., Thomas S., Jung G., Venogopal R. (1998) Inferior colliculus in echolocating and non-echolocating aquatic and terrestrial mammals: histology and immunohistochemistry. *Soc. Neurosci. Abstr.* **24**, 1881.
149. Perl D.P., Purohit D.P., Kakulas B.A., Hof P.R. (1999) Changes in the neuropathologic features of parkinsonism-dementia complex of Guam (PDC) cases from the 1960s compared to current cases. *J. Neuropathol. Exp. Neurol.* **58**, 515.
150. Hof P.R., Good P.F., Bouras C., Morrison, J.H., Perl D.P. (1999) Stereologically valid quantitative indices of neurodegeneration in Alzheimer's disease and normal aging. *J. Neuropathol. Exp. Neurol.* **58**, 533.
151. Hof P.R., Perl D.P., Nimchinsky E.A., Erwin J.M. (1999) The entorhinal cortex in aged chimpanzees (*Pan troglodytes*): stereologic analyses of neuron number and volume. *Am. J. Primatol.* **49**, 60-61.
152. Gold G., Giannakopoulos P., Duc M., Michel J.P., Hof P.R., Bouras C. (1999) Neural substrates of spatial and temporal disorientation in Alzheimer's disease. *Soc. Neurosci. Abstr.* **25**, 53.
153. Gannon P.J., Kheck N.M., Hof P.R. (1999) Brain language area evolution III: left hemisphere predominant hemispheric asymmetry of cytoarchitectonic, but not gross anatomic, *planum temporale* homolog in Old World monkeys. *Soc. Neurosci. Abstr.* **25**, 105.
154. Kheck N.M., Hof P.R., Deftereos M., Lo T., Gannon P.J. (1999) Brain language area evolution IV: chemoarchitectonic interhemispheric asymmetries of the *planum temporale* (PT) homolog in Old World monkeys. *Soc. Neurosci. Abstr.* **25**, 105.
155. Erwin J.M., Perl D.P., Nimchinsky E.A., Hof P.R. (1999) Stereologic analyses of neuron number and volume in the entorhinal cortex of aged chimpanzees. *Soc. Neurosci. Abstr.* **25**, 105.
156. Pham K., Hof P.R., McEwen B.S. (1999) Chronic restraint stress suppresses proliferation of neural precursors in the dentate gyrus but not survival of granule cells. *Soc. Neurosci. Abstr.* **25**, 255.
157. Duan H., He Y., Wicinsky B., Yeung G., Page T.L., Janssen W.G.M., Morrison J.H., Hof P.R. (1999) Age-related changes in cortical projection neurons in macaque monkey: dendrite morphology, spine density, and neurochemical features. *Soc. Neurosci. Abstr.* **25**, 362.

158. Jung M.Y., Hof P.R., Schmauss C. (1999) Expression of calbindin-D28K immunoreactivity in the dorsal striatum of mice lacking dopamine D₂, D₃ and D₂/D₃ receptors. *Soc. Neurosci. Abstr.* **25**, 378.
159. Bussière T., Wicinsky B., Lin G.I., Perl D.P., Davies P., Nixon R., Morrison J.H., Hof P.R. (1999) Early neurodegenerative alterations in the cerebral cortex during normal aging and Alzheimer's disease. *Soc. Neurosci. Abstr.* **25**, 593.
160. Hof P.R., Wicinsky B., Lin G.I., Bussière T., Giannakopoulos P., Bouras C., Perl D.P., Morrison J.H. (1999) Neurofilament proteins identify vulnerable neocortical neurons: stereologic analysis in normal aging and Alzheimer's disease. *Soc. Neurosci. Abstr.* **25**, 593.
161. Kövari E., Giannakopoulos P., Hof P.R., Bouras C. (1999) Structural changes in the subgenual prefrontal cortex in schizophrenia and mood disorders. *Soc. Neurosci. Abstr.* **25**, 817.
162. Vogt B.A., Vogt L.J., Bouras C., Hof P.R. (1999) Posterior cortical atrophy in Alzheimer's disease: multivariate analysis of cingulate neurons and elevated amyloid-β43. *Soc. Neurosci. Abstr.* **25**, 837.
163. Buée L., Mailliot C., Bussière T., Sergeant N., Cordoliani M.A., Wattez A., Maurage C.A., Ruchoux M.M., Hof P.R., Pasquier F., Vermersch P., Delacourte A., Lacombe P. (1999) Aggregation of different sets of tau isoforms among neurodegenerative disorders: a problem of neuronal subpopulations, cell trafficking or polymorphisms? *Soc. Neurosci. Abstr.* **25**, 1095.
164. Lilliehöök C., Choksi N.Y., Hof P., Choi E.K., Zaidi N.F., Wasco W., Tomita T., Iwatsubo T., Buxbaum J.D. (1999) Characterization of the presenilin-binding protein calsenilin. *Soc. Neurosci. Abstr.* **25**, 1300.
165. Glezer I.I., Hof P.R., Morgane P.J., Malhado L., Tzirlin Y., Venogupal R. (1999) cerebellar cortex in aquatic and terrestrial mammals: histological and immunocytochemical analyses of calcium-binding protein-immunoreactive neurons. *Soc. Neurosci. Abstr.* **25**, 1402.
166. Perl D.P., Good P.F., Craig U.K., Hof P.R., Galasko D., Wiederholt W.C. (1999) The Micronesian Health Study Brain Bank: a resource for research on Guam amyotrophic lateral sclerosis/parkinsonism-dementia complex. *Soc. Neurosci. Abstr.* **25**, 1592.
167. He Y., Hof P.R., Janssen W.G.M., Rothstein J.D., Morrison J.H. (1999) Glutamate receptor subunit GluR2 and transporter EAAC1 are differently distributed in the entorhinal cortex of macaque monkey. *Soc. Neurosci. Abstr.* **25**, 2237.
168. Erwin J., Hof P., Gannon P., Holloway R., Perl D. (2000) A research resource for comparative and evolutionary primate biology. *Am. J. Phys. Anthropol. Suppl.* **30**, 146.
169. Gannon P.J., Hof P.R., Kheck N.M. (2000) Brain language evolution: human-like pattern of cytoarchitectonic, but not gross anatomic, L>R hemispheric asymmetry of planum temporale homolog in *Macaca fascicularis*. *Am. J. Phys. Anthropol. Suppl.* **30**, 155.
170. Peburn T.A., Sheridan K.A., Kheck N.M., Hof P.R., Gasdotas J., Erwin J., Gannon P.J. (2000) Differences in the brainstem facial motor nucleus in *Erythrocebus patas* and

- Macaca fascicularis*: a qualitative and morphometric analysis. *Am. J. Phys. Anthropol.* **Suppl. 30**, 247.
171. Gannon P.J., Kheck N.M., Deftereos M., Braun A.R., Hof P.R. (2000) Gross anatomic, cytoarchitectonic and chemoarchitectonic interhemispheric asymmetries in auditory association cortex. *Proc. Assoc. Res. Otolaryngol.* **23**, 150.
 172. Walker R.H., Muralidharan N., Gujjari P., Hof P., Olanow C.W., Brin M.F., Shashidharan P. (2000) Distribution and immunohistochemical characterization of torsinA-immunoreactive neurons in rat and macaque brain. *Neurology* **54** (**Suppl. 3**), A54.
 173. Hof P.R. (2000) Structural alterations in neurons in aging brain and Alzheimer's disease. *J. Alzheimer Dis.* **2**, 50.
 174. Lee P.W.H., Gilissen E., Simmons R., Hakeem A., Allman J.M., Erwin J.M., Hof P.R. (2000) Relationships between encephalization and morphology of specialized classes of pyramidal neurons in primates. *Am. J. Primatol.* **51** (**Suppl. 1**), 69-70.
 175. Bussière T., Wicinski B.A., Lin G.I., Perl D.P., Davies P., Nixon R.A., Morrison J.H., Hof P.R. (2000) Stereologic analysis of vulnerable neocortical neurons in normal aging and Alzheimer's disease. *Neurobiol. Aging* **21** (**Suppl. 1**), S24-S25.
 176. Lee P.W., Gilissen E., Simmons R., Hakeem A., Allman J.M., Erwin J.M., Hof P.R. (2000) Morphometry of specialized subsets of pyramidal neurons in primate brain evolution. *Soc. Neurosci. Abstr.* **26**, 189.
 177. Kheck N.M., Gannon P.J., Deftereos M., Hof P.R. (2000) Cytoarchitectonic heterogeneity within the lateralized profile of area Tpt in *Macaca fascicularis*. *Soc. Neurosci. Abstr.* **26**, 189.
 178. Gannon P.J., Kheck N.M., Brown A.R., Butman J., Erwin J.M., Hof P.R. (2000) Significance of the endocranial feature Broca's cap for onset of brain language area asymmetries in early *Homo*. *Soc. Neurosci. Abstr.* **26**, 189.
 179. Sherwood C.C., Peburn T.A., Kheck N.M., Deftereos M., Erwin J.M., Yuan M.S., Holloway R.L., Hof P.R., Gannon P.J. (2000) Specializations of the facial motor nucleus in two species of Old World monkey: a stereological analysis. *Soc. Neurosci. Abstr.* **26**, 189.
 180. Ely J.J., Erwin J.M., Navidi A., Hof P.R. (2000) DNA sequence variation in Alzheimer genes among chimpanzees. *Soc. Neurosci. Abstr.* **26**, 231.
 181. Wen P.H., Shao X., Hof P.R., Wisniewski T., Kelley K., Friedrich Jr. V.L., Robakis N.K., Elder G. (2000) Overexpression of presenilin-1 inhibits neurogenesis in the hippocampus of young adult mice. *Soc. Neurosci. Abstr.* **26**, 744.
 182. Shah R.A., He Y., Janssen W.G.M., Adams M.M., Duan H., Hof P.R., Morrison J.H. (2000) Quantifying changes in receptor proteins within synapses and spines. *Soc. Neurosci. Abstr.* **26**, 877.

183. Vissavajjhala P., Hof P.R., Andrews G., He Y., Moran T., Janssen W.G.M., Morrison J.H. (2000) Quantitative analysis of the cellular distribution of AMPA receptor subunit GluR3 in the rat and macaque monkey cerebral cortex. *Soc. Neurosci. Abstr.* **26**, 907.
184. Vogt B.A., Vogt L.J., Perl D.P., Hof P.R. (2000) Cytoarchitecture of the caudomedial lobule in human posterior cingulate cortex. *Soc. Neurosci. Abstr.* **26**, 1236.
185. Duan H., He Y., Wicinski B., Morrison J.H., Hof P.R. (2000) Age-related dendrite and spine changes in corticocortically projecting neurons in macaque monkeys. *Soc. Neurosci. Abstr.* **26**, 1237.
186. Glezer I.I., Hof P.R., Reep R.L., Morgane P.J. (2000) Distribution of calcium-binding protein-immunoreactive neurons in primary areas of cerebral cortex in marine aquatic mammals (Cetacea and Sirenia): immunocytochemical study. *Soc. Neurosci. Abstr.* **26**, 1239.
187. Giannakopoulos P., Gold G., Duc M., Michel J.P., Hof P.R., Bouras C. (2000) Impaired processing of famous faces in Alzheimer's disease is related to neurofibrillary tangle densities in the prefrontal and anterior cingulate cortex. *Soc. Neurosci. Abstr.* **26**, 1545.
188. Sadeghi N., Friend P.D., Bussière T., Wicinski B., Lin G.I., Bouras C., Giannakopoulos P., Robakis N.K., Perl D.P., Morrison J.H., Hof P.R. (2000) Stereologic determination of the relative volume of amyloid deposition in aging and Alzheimer's disease. *Soc. Neurosci. Abstr.* **26**, 1549.
189. Hof P.R., Bussière T., Wicinski B., Lin G.I., Bouras C., Giannakopoulos P., Perl D.P., Morrison J.H. (2000) Age- and Alzheimer's disease-related changes in neocortical pyramidal neurons: stereologic triple labeling analysis. *Soc. Neurosci. Abstr.* **26**, 1552.
190. Bussière T., Wicinski B., Lin G.I., Bouras C., Giannakopoulos P., Perl D.P., Davies P., Morrison J.H., Hof P.R. (2000) Stereologic quantification of neurofibrillary lesions correlates with cognitive status during normal aging and Alzheimer's disease. *Soc. Neurosci. Abstr.* **26**, 1552.
191. Perl D.P., Hof P.R., Erwin J.M. (2001) Brain aging in great apes: a human neuropathologic perspective. *Int. Soc. Primatol. Abstr.* **18**, 365.
192. Hof P.R., Lee P.W.H., Sherwood C., Perl D.P., Gannon P.J., Naidich T., Erwin J.E. (2001) Stereologic analyses of neuron number and volume in the entorhinal cortex and hippocampus of great apes. *Int. Soc. Primatol. Abstr.* **18**, 368.
193. Hof P.R., Lee P.W.H., Gilissen E., Simmonds R., Hakeem A., Allman J.M., Nimchinsky E.A., Perl D.P., Erwin J.E. (2001) Relationships between encephalization and morphology of neuronal subtypes in primates. *Int. Soc. Primatol. Abstr.* **18**, 369.
194. Ely J.J., Erwin J.M., Navidi A., Hof P.R. (2001) DNA sequence variation in Alzheimer genes among chimpanzees. *Int. Soc. Primatol. Abstr.* **18**, 370.
195. Erwin J.M., Perl D.P., Hof P.R., Bloomsmith M., Boysen S., Zihlman A. (2001) Caring for and learning from the oldest apes. *Int. Soc. Primatol. Abstr.* **18**, 371.

196. Valachovic A.M., Kheck N.M., Hof P.R., Erwin J., Gannon P.J. (2001) Evolutionary depth of primate brain language areas: interhemispheric symmetry of sylvian fissure, with marked hypertrophy of right middle temporal gyrus, in *Erythrocebus patas*. *Am. J. Phys. Anthropol.* **Suppl. 32**, 153-154.
197. McFarlin S.C., Erwin J.M., Hof P.R., Zihlman A.L., Bromage T.G. (2001) Comparative primate bone microstructure and life history. *J. Morphol.* **248**, 260.
198. Sherwood C., Erwin J., Delman B., Naidich T., Bruner H., Braun A., Holloway R., Gannon P., Perl D., Hof P. (2001) Brain volume in aging great apes: a postmortem MRI study. *Am. J. Primatol.* **54 (Suppl. 1)**, 45-46.
199. Erwin J., Hof P., Ely J., Perl D., Smith K. (2001) An obligation and opportunity: caring for and learning from the oldest apes. *Am. J. Primatol.* **54 (Suppl. 1)**, 61.
200. Duan H., Morrison J.H., Hof P.R. (2001) Age-related changes in the dopaminergic innervation of the prefrontal cortex in macaque monkeys. *Soc. Neurosci. Abstr.* **27**, 100.4 (<http://www.sfn.org>).
201. Johnson L.R., Hou M., Albert Jr L., Farb C., Hof P.R., LeDoux J.E. (2001) Quantification of the total neuronal structure of the fear conditioning circuit of the lateral amygdala of the rat. *Soc. Neurosci. Abstr.* **27**, 187.11 (<http://www.sfn.org>).
202. He Y., Shah R.A., Farb C.R., Janssen W.G., Hof P.R., Rodrigues S., LeDoux J.E., Morrison J.H. (2001) Intrasynaptic organization of NMDA and AMPA receptors on identified synapses in the thalamo-amygdaloid circuit of the rat. *Soc. Neurosci. Abstr.* **27**, 187.12 (<http://www.sfn.org>).
203. Rodriguez A., Kelliher K.T., Ehlenberger D., Henderson S.C., Einstein M., Rolshud D., Duan H., Morrison J.H., Wearne S.L., Hof P.R. (2001) Implementation of algorithms for high resolution 3-D morphologic analysis of identified cortical neurons: application to age-related alterations. *Soc. Neurosci. Abstr.* **27**, 316.9 (<http://www.sfn.org>).
204. Henry B.I., Rothnie P., Hof P.R., Wearne S.L. (2001) Determination of dendritic branching ratios and spine distribution patterns using mass multifractal and wavelet transform analysis. *Soc. Neurosci. Abstr.* **27**, 316.10 (<http://www.sfn.org>).
205. Bai L., Hof P.R., Standaert D.G., Nelson S.E., Xing Y., Young A.B., Magnusson K.R. (2001) Effects of aging on the mRNA expression of NMDA receptor subunits in primates. *Soc. Neurosci. Abstr.* **27**, 327.16 (<http://www.sfn.org>).
206. Bussière T., Wicinski B., Buitron C., Giannakopoulos P., Bouras C., Morrison J.H., Perl D.P., Hof P.R. (2001) Stereologic analysis of different types of neurofibrillary lesions in aging and Alzheimer's disease. *Soc. Neurosci. Abstr.* **27**, 429.8 (<http://www.sfn.org>).
207. Hof P.R., Bussière T., Good P.F., Hsu A., Wicinski B., Bouras C., Morrison J.H., Perl D.P. (2001) Stereologic analysis of neurofibrillary tangle formation in Guam parkinsonism dementia complex. *Soc. Neurosci. Abstr.* **27**, 429.19 (<http://www.sfn.org>).
208. Gold G.C., Kövari E., Corte G., Herrmann F.R., Canuto A., Bussière T., Hof P.R., Bouras C., Giannakopoulos P. (2001) Clinical validity of a β -protein deposition staging in brain aging and Alzheimer's disease. *Soc. Neurosci. Abstr.* **27**, 547.17 (<http://www.sfn.org>).

209. Farrell S.F., Hof P.R., McGinnis M.Y. (2001) Stereologic analysis of hypothalamic nuclei following high dose testosterone administration in adult male rats. *Soc. Neurosci. Abstr.* **27**, 627.5 (<http://www.sfn.org>).
210. Chakraborty T.R., Hof P.R., Gore A.C. (2001) Quantitative stereological analysis of expression of estrogen receptor α in hypothalamus during aging. *Soc. Neurosci. Abstr.* **27**, 628.9 (<http://www.sfn.org>).
211. Glezer I.I., Aggarwal A., Nathan M., Hof P.R., Reep R.L., Morgane P.J. (2001) Computerized image analysis of neurons in primary visual, acoustic, and motor areas in marine aquatic mammals (*Cetacea* and *Sirenia*) and primates (*Homo sapiens*). *Soc. Neurosci. Abstr.* **27**, 816.6 (<http://www.sfn.org>).
212. Gannon P.J., Valachovic A.M., Hof P.R., Kheck N.M., Erwin J. (2001) Evolution of primate brain receptive language area homologs: interhemispheric symmetry of sylvian fissure length in *Erythrocebus patas* with operculum of sylvian point by right middle temporal gyrus. *Soc. Neurosci. Abstr.* **27**, 822.1 (<http://www.sfn.org>).
213. Vogt B.A., Bush G., Hof P.R., Vogt L.J. (2001) Structure and activation of human rostral cingulate motor area. *Soc. Neurosci. Abstr.* **27**, 825.2 (<http://www.sfn.org>).
214. Rivara C., Kövari E., Surini M., Hof P.R., Bouras C. (2001) A stereological analysis of Betz cells along human primary motor cortex. *Soc. Neurosci. Abstr.* **27**, 825.5 (<http://www.sfn.org>).
215. Erwin J.M., Sherwood C.C., Delman B.N., Naidich T.P., Gentile J.C., Bruner H.J., Braun A.R., Holloway R.L., Gannon P.J., Perl D.P., Hof P.R. (2001) The aging great ape brain: a volumetric MRI study of hippocampus and striatum. *Soc. Neurosci. Abstr.* **27**, 855.3 (<http://www.sfn.org>).
216. Ely J.J., Sherwood C.C., Delman B.N., Gentile J.C., Naidich T.P., Perl D.P., Gannon P.J., Erwin J.M., Hof P.R. (2001) Comparative atlases of great ape brains from magnetic resonance images. *Soc. Neurosci. Abstr.* **27**, 855.4 (<http://www.sfn.org>).
217. Sherwood C.C., de Miguel C., Henneberg M., Perl D.P., Erwin J.M., Hof P.R. (2001) The brain of the koala: cyto- and myeloarchitectural features. *Soc. Neurosci. Abstr.* **27**, 855.5 (<http://www.sfn.org>).
218. Stepanyants A., Hof P.R., Chklovskii D.B. (2001) Geometry and structural plasticity of synaptic connectivity. *Soc. Neurosci. Abstr.* **27**, 903.7 (<http://www.sfn.org>).
219. Shah R.A., Adams M.M., He Y., Janssen W.G., Hof P.R., Morrison J.H. (2001) SYNBIN: a new tool for quantitative immunogold electron microscopy. *Soc. Neurosci. Abstr.* **27**, 924.19 (<http://www.sfn.org>).
220. Kompoliti K., Chu Y., Kladis T., McKay H., Roberts J., Hof P., Mufson E.J., Morrison J., Kordower J.H. (2001) Effects of estrogen replacement therapy on the cholinergic and dopaminergic systems of ovariectomized aged rhesus monkeys. *Soc. Neurosci. Abstr.* **27**, 965.7 (<http://www.sfn.org>).

221. Perl D., Hof P., Nimchinsky E., Gannon P., Erwin J. (2001) Neurobiology of aging in great apes and human. *The Apes: Challenges for the 21st Century*, Chicago Zool. Soc. p. 376.
222. Hof P.R., Haroutunian V., Davis K.L. (2001) Decreased number of oligodendrocytes in the prefrontal cortex of schizophrenics: a stereologic analysis. *Proc. Am. Coll. Neuropsychopharmacol.* (<http://www.acnp.org/abstracts/>).
223. Hof P.R., Morrison J.H. (2002) The entorhinal cortex in the early stages of Alzheimer's disease: comparison with the neocortex. *Proc. Am. Soc. Exp. Biol.* CD-ROM, #2579.
224. Sherwood C.C., Allman J.M., Hakeem A., Singer A.A., Holloway R.L., Perl D.P., Erwin J.M., Hof P.R. (2002) Evolution of the primate hippocampal formation: a stereologic analysis. *Am. J. Primatol.* **57** (Suppl. 1), 64-65.
225. Ely J.J., Khun H.H., Boysen S.T., Erwin J.M., Hof P.R., Frels W.I. (2002) Identical DNA sequences in FOXP2 language gene between humans, chimpanzees (*Pan troglodytes*) and bonobos (*Pan paniscus*). *Am. J. Primatol.* **57** (Suppl. 1), 78-79.
226. Wen P.H., Hof P.R., Austin G., Robakis N.K., Haroutunian V., Elder G.A. (2002) The presenilin-1 familial Alzheimer's disease mutant P117L inhibits neurogenesis in adult hippocampus following environmental enrichment. *Soc. Neurosci. Abstr.* **28**, 295.19 (<http://www.sfn.org>).
227. Ehlenberger D.B., Rodriguez A., Kelliher K.T., Henderson S.C., Morrison J.H., Hof P.R., Wearne S.L. (2002) Automated reconstruction of high resolution 3D neuronal morphology from confocal and multiphoton images. *Soc. Neurosci. Abstr.* **28**, 312.2 (<http://www.sfn.org>).
228. Rothnie P.G., Henry B.I., Hof P.R., Wearne S.I. (2002) 3D Sholl analysis distinguishes functionally different neocortical pyramidal neurons in macaque monkeys. *Soc. Neurosci. Abstr.* **28**, 312.19 (<http://www.sfn.org>).
229. Hao J., Janssen W.G.M., Tang Y., Roberts J., Hof P.R., Morrison J.H. (2002) Estrogen induces formation of dendritic spines in hippocampus of young and aged female rhesus monkeys. *Soc. Neurosci. Abstr.* **28**, 368.12 (<http://www.sfn.org>).
230. Tang Y., Janssen W.G.M., Hao J., Roberts J., McKay H., Hof P.R., Morrison J.H. (2002) Effects of estrogen on dendritic spines in prefrontal cortex of young female rhesus monkeys. *Soc. Neurosci. Abstr.* **28**, 368.13 (<http://www.sfn.org>).
231. Hof P.R., Haroutunian V., Byne W., Friedrich Jr. V.L., Buitron C., Perl D.P., Davis K.L. (2002) Loss and abnormal spatial distribution of oligodendrocytes in schizophrenia: stereologic analysis of area 9. *Soc. Neurosci. Abstr.* **28**, 704.14 (<http://www.sfn.org>).
232. Schmitz C., Korr H., Hof P.R., Heinzen H. (2002) No alteration in the total number of neurons in the striatum in schizophrenia. *Soc. Neurosci. Abstr.* **28**, 704.15 (<http://www.sfn.org>).
233. Erwin J.M., Sherwood C.C., Allman J.M., Hakeem A., Singer A.A., Holloway R.L., Perl D.P., Hof P.R. (2002) Allometric scaling and socioecological correlates of hippocampal morphometry in primates. *Soc. Neurosci. Abstr.* **28**, 877.17 (<http://www.sfn.org>).

234. Sherwood C.C., Holloway R.L., Gannon P.J., Erwin J.M., Hof P.R. (2002) Phylogenetic specializations of orofacial motor nuclei in primates. *Soc. Neurosci. Abstr.* **28**, 877.18 (<http://www.sfn.org>).
235. Broadfield D.C., Sherwood C.C., Hof P.R., Holloway R.L. (2002) definitive evidence for lateralization of Broca's area in African apes, or not. *Soc. Neurosci. Abstr.* **28**, 877.19 (<http://www.sfn.org>).
236. Andrews G.A., Janssen W.G.M., Perl D.P., Haroutunian V., Giannakopoulos P., Bouras C., Morrison J.H., Hof P.R. (2002) Quantitative analysis of dendritic spine and synaptic markers in the prefrontal cortex in aging and Alzheimer's disease. *Soc. Neurosci. Abstr.* **28**, 882.14 (<http://www.sfn.org>).
237. Hof P.R., Perl D.P., Morrison J.H. (2003) Stereology-oriented brain banking: development and applications to the study of Alzheimer's disease and schizophrenia. *Proc. Am. Soc. Exp. Biol.* CD-ROM, #274.3.
238. Broadfield D.C., Sherwood C., Hof P.R., Holloway R.L. (2003) Broca's area homologue in great apes: implications for language evolution? *Am. J. Phys. Anthropol.* **Suppl.** **36**, 71-72.
239. Sherwood C.C., Holloway R.L., Zilles K., Erwin J.M., Gannon P.J., Hof P.R. (2003) Co-evolution of communication in the brain of primates: new evidence from the brainstem and motor cortex. *Am. J. Phys. Anthropol.* **Suppl.** **36**, 190.
240. Erwin J., Robertson J., Perl D.P., Hof P.R., Ely J., Sherwood C., Hansen B.C. (2003) An integrative bioinformatics initiative: learning more from each primate through multi-disciplinary database management, diagnostic imaging, and tissue sharing. *Am. J. Primatol.* **60 Suppl. 1**, 105-106.
241. Sherwood C.C., Cranfield M.R., Mehlman P.T., Lilly A.A., Garbe J., Lowenstein L.J., Rein T.R., Holloway R.L., Tang C.Y., Erwin J.M., Whittier C., Nutter F., Hof P.R. (2003) Comparative brain anatomy of mountain gorillas (*Gorilla gorilla beringei*). *Am. J. Primatol.* **60 Suppl. 1**, 121-122.
242. Van der Gucht E., Hof P.R., Arckens L. (2003) Neurochemical organization, architectonic subdivision and three-dimensional reconstruction of cat ventral lateral geniculate nucleus and monkey pregeniculate nucleus. *Soc. Neurosci. Abstr.* **29**, 68.7 (<http://www.sfn.org>).
243. Marino L., Sherwood C.C., Tang C.Y., Delman B.N., Naidich T.P., Johnson J.I., Hof P.R. (2003) Comparative neuroanatomy of the killer whale (*Orcinus orca*) and amazon river dolphin (*Inia geoffrensis*) from magnetic resonance images. *Soc. Neurosci. Abstr.* **29**, 94.10 (<http://www.sfn.org>).
244. Vogt B.A., Hof P.R., Friedman D.P., Vogt L. (2003) Noradrenergic innervation of the medial pain system in monkey. *Soc. Neurosci. Abstr.* **29**, 176.6 (<http://www.sfn.org>).
245. Hof P.R., Bouras C., Giannakopoulos P., Buitron C., Perl D.P., Haroutunian V., Morrison J.H. (2003) Stereologic assessment of microvascular pathology in aging and Alzheimer disease. *Soc. Neurosci. Abstr.* **29**, 203.5 (<http://www.sfn.org>).

246. Rocher A.B., Oruganti V., Rodriguez A., Ehlenberger D., Henderson S.C., Gama-Sosa M., Gama-Sosa R., Hao J., Elder G., Wearne S.L., Hof P.R. (2003) Application of high-resolution 3D neuronal morphologic analysis from multiphoton images to EGFP mice. *Soc. Neurosci. Abstr.* **29**, 218.13 (<http://www.sfn.org>).
247. Koschnick J.R., Slegers L.H.A., Rocher A.B., Gama-Sosa M., Gama-Sosa R., Elder G., Sherwood C.C., Lazzarini R.N., Friedrich V.L., Hof P.R. (2003) Neuronal alterations in a MAG knockout mouse model of schizophrenia. *Soc. Neurosci. Abstr.* **29**, 313.7 (<http://www.sfn.org>).
248. Tang Y., Fink S.E., Janssen W.G.M., McKay H., Roberts J.A., Hof P.R., Morrison J.H. (2003) Electron microscopic analysis of estrogen receptor- α in prefrontal cortex and hippocampal CA1 of young female Rhesus monkeys. *Soc. Neurosci. Abstr.* **29**, 395.4 (<http://www.sfn.org>).
249. Rodriguez A., Ehlenberger D., Kelliher K.T., Henderson S.C., Hof P.R., Wearne S.L. (2003) Automated dendritic arbor extraction and surface area estimation from confocal and multiphoton imaged data. *Soc. Neurosci. Abstr.* **29**, 428.18 (<http://www.sfn.org>).
250. Youakim M., Baizer J.S., Hof P.R., Alberico R. (2003) The prelunate sulcus in macaque monkey. *Soc. Neurosci. Abstr.* **29**, 596.21 (<http://www.sfn.org>).
251. Alphs H.H., Johnson L.R., Doyere V., Hof P.R., LeDoux J.E. (2003) Differences in intrinsic properties of dorsally and ventrally located lateral amygdala neurons of the rat. *Soc. Neurosci. Abstr.* **29**, 623.1 (<http://www.sfn.org>).
252. Johnson L.R., Radley J.J., Martino J., Lamprecht R., Hof P.R., LeDoux J.E., Morrison J.H. (2003) Amygdala-dependent learning increases the number of spinophilin-immunoreactive dendritic spines in the lateral amygdala. *Soc. Neurosci. Abstr.* **29**, 623.7 (<http://www.sfn.org>).
253. Radley J.J., Sisti H.M., Hao J., Hof P.R., McEwen B.S., Morrison J.H. (2003) Chronic behavioral stress induces apical dendritic reorganization in pyramidal neurons of the medial prefrontal cortex. *Soc. Neurosci. Abstr.* **29**, 623.8 (<http://www.sfn.org>).
254. Vereczki V., Martin E., Rosenthal R.E., Hof P.R., Sherwood C.C., Chinopoulos C., Hu W., Hoffman G.E., Fiskum G. (2003) Normoxic versus hyperoxic ventilation after cardiac arrest: hippocampal protein nitration, pyruvate dehydrogenase immunoreactivity, and cell death. *Soc. Neurosci. Abstr.* **29**, 739.8 (<http://www.sfn.org>).
255. Siram A., Blackband S., Grant S., Liang Z., Hof P.R., Li L., Benveniste H. (2003) C57BL/6J mouse brain probabilistic atlases by 17.6 T MRM. *Soc. Neurosci. Abstr.* **29**, 758.10 (<http://www.sfn.org>).
256. Hajianpour A., Ho L., Tang C., Hof P.R., Byne W., Pompl P., Pasinetti G.M. (2003) Application of magnetic resonance microscopy (MRI) for *in vivo* non-invasive, longitudinal evaluation of dopaminergic neurodegeneration. *Soc. Neurosci. Abstr.* **29**, 778.5 (<http://www.sfn.org>).
257. Kabaso D., Henry B.I., Hof P.R., Wearne S.L. (2003) Effects on action potential backpropagation of age-related changes in dendritic branching and spine densities of

- neocortical pyramidal neurons in macaque monkey. *Soc. Neurosci. Abstr.* **29**, 810.8 (<http://www.sfn.org>).
258. Tang C., Hajianpour A., Aguinaldo G., Ho L., Pasinetti G., Hof P.R., Perl D.P., Sadowski M., Wisniewski T. (2003) Ex-vivo magnetic resonance imaging of β -amyloid plaques in transgenic AD mice. *Soc. Neurosci. Abstr.* **29**, 862.3 (<http://www.sfn.org>).
259. Head E., Cotman C.W., Hof P.R., Bouras C., Su J.H., Kim R.C., Haier R., Lott I.T. (2003) Parallel compensatory and pathological events in the hippocampus of middle aged individuals with Down's syndrome. *Ann. Neurol.* **54**(Suppl. 7), S50-S51.
260. Gilissen E., Leroy K., Brion J.P., Erwin J.M., Hof P.R. (2004) A cellular aging pattern unique to humans and common chimpanzees. *Am. J. Phys. Anthropol.* **Suppl. 38**, 100.
261. Schmitz C., Heinsen H., Steinbusch H.W.M., Hof P.R. (2004) Mosaic of discrete quantitative histologic alterations in the brains of schizophrenics, providing clues to the disease pathogenesis. *Biol. Psychiatry* **55**:160S.
262. Gold G., Kövari E., Herrmann F.R., Canuto A., Hof P.R., Michel J.P., Bouras C., Giannakopoulos P. (2004) Cortical microinfarcts and demyelination significantly affect cognition in brain aging. *Neurobiol. Aging* **25** (Suppl. 1), S12.
263. Hao J., Rapp P.R., Leffler A., Leffler S., Janssen W.G.M., McKay H., Roberts J.A., Wearne S.L., Hof P.R., Morrison J.H. (2004) Long-term cyclic estrogen replacement increases spine density in the prefrontal cortex of aged ovariectomized rhesus monkeys. *Soc. Neurosci. Abstr.* **30**, 72.7 (<http://www.sfn.org>).
264. Radley J.J., Rocher A.B., Hao J., McCall T., Wang A., Hof P.R., McEwen B.S., Morrison J.H. (2004) Chronic behavioral stress decreases apical dendritic spine density in the medial prefrontal cortex. *Soc. Neurosci. Abstr.* **30**, 208.1 (<http://www.sfn.org>).
265. Rocher A.B., Halstead J.C., Meier D.M., Janssen W.G.M., Radley J.J., Hof P.R., Griep R.B. (2004) Dendritic reorganization in prefrontal cortex pyramidal neurons following deep hypothermic circulatory arrest in pigs. *Soc. Neurosci. Abstr.* **30**, 229.4 (<http://www.sfn.org>).
266. King A.R., Lutjens R., Crawford E.L.F., Hof P.R., Sanna P.P. (2004) Differential subcellular distribution of P70 S6 kinase (P70S6K) phosphoforms. *Soc. Neurosci. Abstr.* **30**, 498.14 (<http://www.sfn.org>).
267. Kabaso D.M., Luebke J.I., Henry B.I., Hof P.R., Wearne S.L. (2004) Morphologic changes in dendritic structure and spine densities may account for age-related increases in action potential firing rates. *Soc. Neurosci. Abstr.* **30**, 638.18 (<http://www.sfn.org>).
268. Vereczki V., Rosenthal R.E., Hof P.R., Sherwood C.C., Hu W., Hoffman G.E., Fiskum G. (2004) Protection against canine hippocampal neuronal damage by normoxic compared to hyperoxic resuscitation after cardiac arrest: an unbiased stereologic analysis. *Soc. Neurosci. Abstr.* **30**, 682.17 (<http://www.sfn.org>).
269. Tang Y., Minwalla L., Janssen W.G.M., Hao J., Adams M.M., McKay H., Roberts J.A., Hof P.R., Rapp P.R., Morrison J.H. (2004) Effects of estrogen on excitatory synapses in

- hippocampal CA1 of aged female rhesus monkeys. *Soc. Neurosci. Abstr.* **30**, 757.16 (<http://www.sfn.org>).
270. Bailey T.L., Rivara C.B., von Gunten A., Giannakopoulos P., Bouras C., Morrison J.H., Perl D.P., Haroutunian V., Hof P.R. (2004) Region-specific alterations of cortical microvasculature in aging and dementia. *Soc. Neurosci. Abstr.* **30**, 902.2 (<http://www.sfn.org>).
271. Schmitz C., Kreczmanski P., Rutten B.P.F., Steinbusch H.W.M., Heinsen H., Perl D.P., Hof P.R. (2004) Neuropathology of the anterior cingulate cortex (ACC) in a well characterized sample of brains from schizophrenics. *Soc. Neurosci. Abstr.* **30**, 909.13 (<http://www.sfn.org>).
272. Coskren P., Rocher A.B., Gama-Sosa M., De Gasperi R., Elder G., Henderson S.C., Henry B.I., Hof P.R., Wearne S. L. (2004) Global 3D morphometric analysis of neuronal networks from confocal images of EGFP mouse during normal aging. *Soc. Neurosci. Abstr.* **30**, 922.26 (<http://www.sfn.org>).
273. Ehlenberger D.B., Rodriguez A., Kelliher K.T., Rocher A.B., Henderson S.C., Hof P.R., Wearne S.L. (2004) Techniques for semi-automated 3D dendritic arbor extraction from medium to low-resolution and noisy fluorescence microscopy images. *Soc. Neurosci. Abstr.* **30**, 922.27 (<http://www.sfn.org>).
274. Broide R.S., Hof P.R., Morrison J.H., Bloom F.E., Young W.G. (2004) High-resolution digital atlas of the C57Bl/6 mouse brain. *Soc. Neurosci. Abstr.* **30**, 1032.3 (<http://www.sfn.org>).
275. Hof P.R., Sherwood C.C. (2005) Neurochemical specializations in the mammalian cerebral cortex. *Proc. Am. Soc. Exp. Biol.* CD-ROM, #941.1.
276. Schmitz C., Kreczmanski P., Schmidt-Kastner R., Heinsen H., Hof P. (2005) No alterations in capillary length density in the prefrontal cortex of schizophrenics. *ICOSR Meeting Proc.* <http://icosr.abstractcentral.com/>, *Schizophrenia Bull.* **31**(2).
277. Tang C., Friedman J., Buchsbaum M.S., Hajianpour A., Osowsky J., Hof P.R., Davis K., Gorman J.M. (2005) Diffusion tensor imaging: correlational differences of fractional anisotropy with age between normal controls and schizophrenic patients. *Biol. Psychiatry* **57 Suppl.**, 23S-24S.
278. Segal D., Haroutunian V., Perl D.P., Schmitz C., Hof P.R. (2005) Altered spatial distribution of oligodendrocytes in the cingulum bundle of schizophrenics. *Biol. Psychiatry* **57 Suppl.**, 28S.
279. Hof P.R., Segal D., Rocher A.B., Koschnick J.R., Slegers L.H.A., Haroutunian V., Gama-Sosa M., Elder G. (2005) Altered morphology of neurons in a MAG knockout mouse model of schizophrenia. *Biol. Psychiatry* **57 Suppl.**, 28S-29S.
280. Hof P.R. (2005) Quantitative neuropathology of anterior cingulate cortex in schizophrenia. *Biol. Psychiatry* **57 Suppl.**, 158S.

281. Friedman J., Tang C., Hajianpour A., Osowsky J., Hof P.R., Gorman J.M., Buchsbaum M.S., Davis K.L. (2005) Diffusion tensor imaging: correlational analysis of fractional anisotropy and symptoms in schizophrenic patients. *Biol. Psychiatry* **57 Suppl.**, 168S..
282. Celestin J., Friedman J., Tang C., Steward D.G., Hajianpour A., Osowsky J., Hof P.R., Gorman J.M., Buchsbaum M.S., Davis K.L. (2005) The correlation of fractional anisotropy and age of onset of schizophrenia. *Biol. Psychiatry* **57 Suppl.**, 183S.
283. Hopkins W., Sherwood C., Erwin J.M., Perl D., Hof P. (2005) Integrating non-invasive behavioral monitoring with *in vivo* structural imaging and post-mortem stereological studies of great ape neurobiology. *Am. J. Primatol.* **66 (Suppl. 1)**, 62.
284. Akram A., Katsel P.L., Hof P.R., Haroutunian V. (2005) Lipid transport and metabolism genes are upregulated in early stages of Alzheimer's disease. *Soc. Neurosci. Abstr.* **31**, 80.17 (<http://www.sfn.org>).
285. Hof P.R., Janssen W.G.M., Bouras C., Giannakopoulos P., Perl D.P., Morrison J.H., Haroutunian V., Akram A. (2005) Spinophilin-immunoreactive spine number decreases in area 9 and CA1 of patients with Alzheimer's disease. *Soc. Neurosci. Abstr.* **31**, 82.4 (<http://www.sfn.org>).
286. Wang J.N., Mobbs C.V., Hof P.R., Ho L., Pasinetti G.M. (2005) Low carbohydrate caloric restriction diet prevents amyloid neuropathology in a mouse model of Alzheimer's disease. *Soc. Neurosci. Abstr.* **31**, 91.8 (<http://www.sfn.org>).
287. Sherwood C.C., Raghanti M., Wahl E., de Sousa A., Erwin J.M., Hof P.R. (2005) Scaling of inhibitory microcircuitry in areas V1 and V2 of anthropoid primates as revealed by calcium-binding protein immunohistochemistry. *Soc. Neurosci. Abstr.* **31**, 182.19 (<http://www.sfn.org>).
288. Janssen W.G.M., Rocher A.B., Flores T., DeGasperi R., Elder G.A., Hof P.R., Gama-Sosa M.A. (2005) Neuronal degeneration in transgenic mice expressing the entire transcript unit of familial Alzheimer's disease presenilin 1 mutant. *Soc. Neurosci. Abstr.* **31**, 326.17 (<http://www.sfn.org>).
289. Rocher A.B., Hao J., Radley J.J., Kabaso D., Janssen W.G.M., Christoffel D.J., Morrison J.H., Wearne S.L., Hof P.R. (2005) Inter-species variation in the morphology of pyramidal cell dendritic arbors and spines in the prefrontal cortex of mammals. *Soc. Neurosci. Abstr.* **31**, 410.10 (<http://www.sfn.org>).
290. Bailey T.L., Akram A., Giannakopoulos P., Bouras C., Morrison J.H., Perl D.P., Haroutunian V., Hof P.R. (2005) Spine density decline in hippocampal field CA1 correlates with attrition in microvascular integrity in Alzheimer's disease. *Soc. Neurosci. Abstr.* **31**, 441.6 (<http://www.sfn.org>).
291. van Kooten I., Casanova M.F., Switala A.E., van Engeland H., Heinsen H., Steinbusch H.W.M., Hof P.R., Pickett J., Schmitz C. (2005) Neuronal size and number in the neocortex of autistic patients. *Soc. Neurosci. Abstr.* **31**, 448.19 (<http://www.sfn.org>).
292. Casanova M.F., van Kooten I., Switala A.E., van Engeland H., Heinsen H., Steinbusch H.W.M., Hof P.R., Walker L.C., Schmitz C. (2005) Minicolumnar abnormalities in the neocortex of autistic patients. *Soc. Neurosci. Abstr.* **31**, 448.20 (<http://www.sfn.org>).

293. Coskren P., Luebke J.I., Rocher A.B., Hof P.R., Wearne S.L. (2005) Effects of realistic 3D neuron morphology on the stability and robustness of a Hopfield-style network model of working memory. *Soc. Neurosci. Abstr.* **31**, 538.4 (<http://www.sfn.org>).
294. Segal D., Haroutunian V., Schmitz C., Hof P.R. (2005) Altered spatial distribution of oligodendrocytes in the cingulum bundle in schizophrenia. *Soc. Neurosci. Abstr.* **31**, 555.5 (<http://www.sfn.org>).
295. Kreczmanski P., Schmidt-Kastner R., Heinsen H., Steinbusch H.M.W., Hof P.R., Schmitz C. (2005) Stereologic studies of capillary length density in the frontal cortex of schizophrenics. *Soc. Neurosci. Abstr.* **31**, 555.9 (<http://www.sfn.org>).
296. Ehlenberger D.B., Rodriguez A., Kelliher K.T., Rocher A.B., Henderson S.C., Hof P.R., Wearne S.L. (2005) Techniques for automated 3D spine extraction from fluorescence microscopy images. *Soc. Neurosci. Abstr.* **31**, 687.5 (<http://www.sfn.org>).
297. Hamzei-Sichani F., Rocher A.B., Ehlenberger D.B., Young S.R., Hof P.R., Wearne S.L., Stewart M.G., Traub R.D. (2005) Detailed multicompartmental models of hippocampal pyramidal neurons based on high-resolution 3D morphological reconstruction. *Soc. Neurosci. Abstr.* **31**, 738.1 (<http://www.sfn.org>).
298. Bailey T.L., Rivara C.B., Perl D.P., Haroutunian V., Bouras C., Giannakopoulos P., Hof P.R. (2005) Hippocampal microvasculature attrition and cognitive decline in Alzheimer's disease. *J. Neuropathol. Exp. Neurol.* **64**, 467.
299. Bouras C., von Gunten A., Hof P.R., Kövari E., Giannakopoulos P. (2006) Tau pathology in aging and Alzheimer disease. *Neurobiol. Aging* **27**(Suppl. 1), S3.
300. von Gunten A., Kövari E., Bussière T., Rivara C.B., Gold G., Bouras C., Hof P.R., Giannakopoulos P. (2006) Cognitive impact of Alzheimer disease neuronal pathology: lessons from centenarians. *Neurobiol. Aging* **27**(Suppl. 1), S9.
301. Gold G., Kövari E., Herrmann F.R., Canuto A., Hof P.R., Michel J.P., Bouras C., Giannakopoulos P. (2006) Sorting out the cognitive implications of vacular lesions in the aging brain. *Neurobiol. Aging* **27**(Suppl. 1), S9.
302. Casanova M.F., van Kooten I., Switala A.E., van Engeland H., Heinsen H., Steinbusch H.W.M., Hof P.R., Trippe J., Stone J., Schmitz C. (2006) Minicolumnar width abnormalities in autism. *Biol. Psychiatry* **59**(Suppl.), 19S.
303. Casanova M.F., van Kooten I., Switala A.E., van Engeland H., Heinsen H., Steinbusch H.W.M., Hof P.R., Trippe J., Stone J., Schmitz C. (2006) Neuronal size and numbers in autism. *Biol. Psychiatry* **59** Suppl., 20S.
304. Casanova M.F., van Kooten I., Switala A.E., van Engeland H., Heinsen H., Steinbusch H.W.M., Hof P.R., Trippe J., Stone J., Schmitz C. (2006) Abnormalities of cortical minicolumnar organization in the prefrontal lobes of autistic patients. *Biol. Psychiatry* **59** Suppl., 119S.
305. Coplan J.D., Martinez J., Mathew S.J., Tang C., Mao X., Hof P.R., Rosenblum L.A., Shungu D., Gorman J.M. (2006) Abnormal adult social function following early life stress

- in nonhuman primates: metabolic alterations in striatal neurocircuitry. *Biol. Psychiatry* **59 Suppl.**, 165S-166S.
306. Miller M.M., Liston C., Hof P.R., Morrison J.H., McEwen B.S. (2006) Morphological changes in rat anterior cingulate pyramidal neurons correlate with anxiety behavior after acute stress. *Soc. Neurosci. Abstr.* **32**, 58.13 (<http://www.sfn.org>).
307. Dickstein D.L., Brennan A.R., Rocher A.B., Arnsten A.F., Hof P.R. (2006) Structural and functional evidence of successful aging in the rat prefrontal cortex. *Soc. Neurosci. Abstr.* **32**, 80.16 (<http://www.sfn.org>).
308. Casanova M.F., Van Kooten I., Switala A.E., Van England H., Heinsen H., Steinbusch H.W., Hof P.R., Schmitz C. (2006) Abnormalities of cortical minicolumnar organization in the prefrontal lobes of autistic patients. *Soc. Neurosci. Abstr.* **32**, 96.7 (<http://www.sfn.org>).
309. Hamzei-Sichani F., Janssen W.G., Hof P.R., Wearne S.L., Stewart M.G., Whittington M.A., Traub R.D. (2006) Gap junctions couple hippocampal mossy fiber axons to each other and to CA3 pyramidal cell dendrites. *Soc. Neurosci. Abstr.* **32**, 132.9 (<http://www.sfn.org>).
310. Hof P.R., Van der Gucht E. (2006) Cytoarchitecture of the cerebral cortex in cetaceans assessment of interspecific differences. *Soc. Neurosci. Abstr.* **32**, 149.15 (<http://www.sfn.org>).
311. Raghanti M., Stimpson C.D., Erwin J.M., Hof P.R., Sherwood C.C. (2006) Differences in tyrosine hydroxylase- and choline acetyltransferase-containing fibers in prefrontal area 9L of humans, chimpanzees, and macaque monkeys. *Soc. Neurosci. Abstr.* **32**, 159.11 (<http://www.sfn.org>).
312. Sherwood C.C., Stimpson C.D., Raganti M.A., Wildman D.E., Uddin M., Grossman L.I., Goodman M., Redmond J.C., Bonar C.J., Erwin J.M., Hof P.R. (2006) Evolution of increased glial density in human frontal cortex. *Soc. Neurosci. Abstr.* **32**, 159.12 (<http://www.sfn.org>).
313. Allman J.M., Lei D., Hof P.R., Korenberg J.R., Hakeen A.Y., Kaufman J.A., Manaye K.F. (2006) A comparative study of the hypothalamus in apes and humans. *Soc. Neurosci. Abstr.* **32**, 159.14 (<http://www.sfn.org>).
314. Segal D., Haroutunian V., Schmitz C., Hof P.R. (2006) Spatial distribution and density of oligodendrocytes in the cingulum bundle is unaltered in schizophrenia. *Soc. Neurosci. Abstr.* **32**, 188.5 (<http://www.sfn.org>).
315. Kabaso D., Nilson J., Luebke J.I., Hof P.R., Wearne S.L. (2006) Electrotonic analysis of morphologic contributions to increased excitability with aging in neurons of the prefrontal cortex of monkeys. *Soc. Neurosci. Abstr.* **32**, 237.10 (<http://www.sfn.org>).
316. Akram A., Katsel P., Hof P.R., Davis K.L., Haroutunian V. (2006) Association of the expression levels of lipid-related genes with determinants of the early stages of Alzheimer's disease. *Soc. Neurosci. Abstr.* **32**, 274.11 (<http://www.sfn.org>).

317. Radley J.J., Rocher A.B., Rodriguez A., Ehlenberger D., McEwen B.S., Morrison J.H., Wearne S.L., Hof P.R. (2006) Repeated stress induces dendritic spine morphologic alterations in the rat medial prefrontal cortex. *Soc. Neurosci. Abstr.* **32**, 370.5 (<http://www.sfn.org>).
318. Shamy J.L., Barnes C.A., Amaral D.G., Buonocore M.H., Hof P.R., Rapp P.R. (2006) Regional volumetric correlates of spatiotemporal and recognition memory impairment in aged rhesus monkeys. *Soc. Neurosci. Abstr.* **32**, 371.15 (<http://www.sfn.org>).
319. Schmitz C., Takahashi H., Brasnjevic I., Hof P.R., Rutten B.P., Steinbusch H.W. (2006) Age-related loss of calbindin- and parvalbumin-immunoreactive neurons in the hippocampus of a novel Alzheimer transgenic model. *Soc. Neurosci. Abstr.* **32**, 376.9 (<http://www.sfn.org>).
320. Shiromani P.J., Blanco-Centurion C., Xu C., Murillo-Rodriguez E., Gerashchenko D., Hof P.R. (2006) Adenosine and sleep debt in the basal forebrain. *Soc. Neurosci. Abstr.* **32**, 458.13 (<http://www.sfn.org>).
321. Liston C.J., Sepulveda-Orengo M., Miller M.M., Hof P.R., Morrison J.H., McEwen B.S., Quirk G.J. (2006) The effects of chronic and acute restraint stress on extinction of conditioned fear. *Soc. Neurosci. Abstr.* **32**, 464.1 (<http://www.sfn.org>).
322. Rocher A.B., Radley J.J., Ho L., Hof P.R., Gurfein B., Pasinetti G.M. (2006) Changes on dendritic spine density on frontal cortical pyramidal neurons in a mouse model of Alzheimer's disease: effects of a caloric restriction dietary regimen. *Soc. Neurosci. Abstr.* **32**, 467.10 (<http://www.sfn.org>).
323. Coskren P.J., Luebke J.I., Hof P.R., Wearne S.L. (2006) Automated reduction of morphologically detailed multicompartment neuron models for the study of neurodegenerative disorders and aging. *Soc. Neurosci. Abstr.* **32**, 637.21 (<http://www.sfn.org>).
324. Hao J., Janssen W.G., Lou W., Rapp P.R., Hof P.R., Morrison J.H. (2006) Dendritic arbor is reduced with age in pyramidal neurons in are 46 of female rhesus monkeys and it is not responsive to long-term cyclic estrogen treatment. *Soc. Neurosci. Abstr.* **32**, 659.13 (<http://www.sfn.org>).
325. Van der Gucht E., Jacobs S., Arckens L., Hof P.R. (2006) Quantitative cytoarchitecture of the prefrontal cortex of the mouse. *Soc. Neurosci. Abstr.* **32**, 821.14 (<http://www.sfn.org>).
326. Kaufman J.A., Tyszka J.M., Hof P.R., Allman J.M. (2007) White matter pathways in the brain of a gorilla revealed by high-field diffusion MRI. *Am. J. Phys. Anthropol.* **Suppl. 44**, 141.
327. Sherwood C.C., Wahl E., Erwin J.M., Hof P.R., Hopkins W.D. (2007) Histological asymmetries of primary motor cortex predict handedness in chimpanzees (*Pan troglodytes*). *Am. J. Phys. Anthropol.* **Suppl. 44**, 217.
328. Erwin J.M., Hof P., Sherwood C., Perl P., Atsalis S., Margulis S., Robertson J., Arbenz-Smith K. (2007) The Great Ape Aging Project (GAAP): ten years of progress and plans for new directions. *Am. J. Primatol.* **69(Suppl. 1)**, 97.

329. Craig A., Short C., Sherwood C.C., Hof P.R. (2007) Allometric comparison of VMpo across primates. *Soc. Neurosci. Abstr.* **33**, 70.24 (<http://www.sfn.org>).
330. Christoffel D.J., Hao J., Rapp P.R., Janssen W.G.M., Lasley B.L., Hof P.R., Morrison J.H. (2007) Effects of aging and estrogen on the microvasculature of hippocampus and the prefrontal cortex in rhesus monkeys. *Soc. Neurosci. Abstr.* **33**, 87.19 (<http://www.sfn.org>).
331. Hao J., Rapp P.R., Janssen W.G.M., Lou W., Lasley B., Hof P.R., Morrison J.H. (2007) Interactive effects of age and estrogen on cognition and pyramidal neurons in monkey prefrontal cortex. *Soc. Neurosci. Abstr.* **33**, 96.15 (<http://www.sfn.org>).
332. Butti C., Van der Gucht E., Hof P.R. (2007) The developing neocortex of the bottlenose dolphin (*Tursiops truncatus*): a study of the anterior cingulate, anterior insular and frontopolar regions. *Soc. Neurosci. Abstr.* **33**, 193.2 (<http://www.sfn.org>).
333. Raghanti M., Stimpson C.D., Marcinkiewicz J.L., Erwin J.M., Hof P.R., Sherwood C.C. (2007) Differences in cortical serotonergic innervation among humans, chimpanzees, and macaque monkeys. *Soc. Neurosci. Abstr.* **33**, 304.29 (<http://www.sfn.org>).
334. Johnson L.R., Amin A., Kamath A., Alphs A., Hou M., Albert Jr L., Radley J., Hof P.R., LeDoux J.E. (2007) Symmetry is an organizing principle in neuronal dendrotaxis. *Soc. Neurosci. Abstr.* **33**, 307.10 (<http://www.sfn.org>).
335. Gama Sosa L.M., De Gasperi R., Rocher A.B., Perez G., Simons K., Friedrich Jr V.L., Hof P.R., Elder G.A. (2007) Differential effects of brain endothelial cells on neuroprogenitor cell differentiation. *Soc. Neurosci. Abstr.* **33**, 329.5 (<http://www.sfn.org>).
336. Navailles S., Hof P.R., Schmauss C. (2007) Early life stress, fluoxetine, social enrichment, and adult hippocampal neurogenesis: a comparative study of Balb/c and C57Bl/6 mice. *Soc. Neurosci. Abstr.* **33**, 334.6 (<http://www.sfn.org>).
337. Manaye K.F., Xu T., Sharma Y., Bonar C.J., Sherwood C.C., Hof P.R., Allman J.H. (2007) A comparative study of the arginine-vasopressin- and oxytocin-containing neurons in the hypothalamus of apes. *Soc. Neurosci. Abstr.* **33**, 347.5 (<http://www.sfn.org>).
338. Hamzei-Sichani F., Van der Gucht E., Hof P.R. (2007) Atlasing of the mouse brain. I. Photographic, histological, and magnetic resonance microscopy atlas of the adult C57Bl/6j mouse brain. *Soc. Neurosci. Abstr.* **33**, 535.22 (<http://www.sfn.org>).
339. Hof P.R., Christoffel D., Morris J.C., Hohmann J.G., Lein E.S., Howell M., Van der Gucht E. (2007) Atlasing of the mouse brain. II. Gene expression patterns in the prefrontal cortex. *Soc. Neurosci. Abstr.* **33**, 535.23 (<http://www.sfn.org>).
340. Van der Gucht E., Morris J.C., Hohmann J.G., Lein E.S., Howell M., Hof P.R. (2007) Atlasing of the mouse brain. III. Gene expression patterns in the visual cortex. *Soc. Neurosci. Abstr.* **33**, 535.24 (<http://www.sfn.org>).
341. Rodriguez A., Ehlenberger D.B., Dickstein D.L., Hof P.R., Wearne S.L. (2007) Application of Rayburst sampling to automated 3D classification of dendritic spine geometries from fluorescence microscopy images. *Soc. Neurosci. Abstr.* **33**, 536.4 (<http://www.sfn.org>).

342. Kamasawa N., Hamzei-Sichani F., Yasumura T., Janssen W.G.M., Davidson K.G.V., Wearne S.L., Hof P.R., Traub R.D., Rash J.E. (2007) Ultrastructural evidence for mixed synapses in hippocampal principal neurons using thin-section and freeze-fracture replica immunogold labeling (FRIL) electron microscopy. *Soc. Neurosci. Abstr.* **33**, 581.12 (<http://www.sfn.org>).
343. Akram A., Katsel P., Hof P.R., Haroutunian V. (2007) Changes in the expression of genes involved in cholesterol trafficking with the progression of Alzheimer's disease. *Soc. Neurosci. Abstr.* **33**, 795.9 (<http://www.sfn.org>).
344. Segal D., Haznedar M., Newmark R.E., Torosjan Y., Friedman J., Schneidermann J.S., Chu K.W., Hazlett E.A., Mitropoulou V., Tang C.Y. Hof P.R., Buchsbaum M.S. (2007) Diffusion tensor anisotropy in the cingulate gyrus in schizophrenia. *Soc. Neurosci. Abstr.* **33**, 805.23 (<http://www.sfn.org>).
345. Sharma Y., Xu T., Graf W., Fobbs A., Sherwood C.C., Hof P.R., Allman J.H., Manaye K.F. (2007) Comparative anatomy of the locus coeruleus in humans and apes. *Soc. Neurosci. Abstr.* **33**, 830.8 (<http://www.sfn.org>).
346. Dickstein D.L., Gama-Sosa M., Wearne S.L., Hof P.R. (2007) Alterations in dendritic and spine morphology in layer II/III pyramidal neurons of the prefrontal cortex in two Alzheimer's disease model mice. *Soc. Neurosci. Abstr.* **33**, 887.18 (<http://www.sfn.org>).
347. Raghanti M.A., Stimpson C.D., Marcinkiewicz J.L., Erwin J.M., Hof P.R., Sherwood C.C. (2008) Differences in cortical dopaminergic innervation among humans, chimpanzees, and macaque monkeys: a comparative study. *Am. J. Phys. Anthropol. Suppl.* **46**, 176.
348. Raghanti M.A., Sherwood C.C., Hof P.R., Erwin J.M. (2008) Evolutionary changes in cortical neuromodulator innervation within the frontal cortex of humans, chimpanzees, and macaque monkeys. *Am. J. Primatol.* **70** (Suppl. 1), 32.
349. Dickstein D.L., Hof P.R. (2008) Dendritic alterations in layer II/III pyramidal neurons in the frontal cortex of hTau mice during disease progression. *Alzheimer Dementia* **4**(Suppl. 2), T222.
350. Stockton Jr. S.D., Dickstein D.L., Christoffel D., Hof P.R. (2008) Hippocampal cell loss in the hTau mouse model during disease progression. *Alzheimer Dementia* **4**(Suppl. 2), T239-T240.
351. Akram A., Katsel P., Hof P., Haroutunian V. (2008) Coordinated transcriptional and translational changes in cholesterol transporter correlate with cognitive decline in Alzheimer's disease. *Soc. Neurosci. Abstr.* **34**, 45.7 (<http://www.sfn.org>).
352. Schenker N.M., Hopkins W.D., Erwin J.M., Hof P.R., Sherwood C.C. (2008) A stereological analysis of Broca's area homologue in chimpanzees. *Soc. Neurosci. Abstr.* **34**, 78.4 (<http://www.sfn.org>).
353. Butti C., Allman J.M., Hakeem A., Tetreault N.A., Wicinski B., Reidenberg J.S., Cozzi B., Erwin J.M., Sherwood C.C., Hof P.R. (2008) Von Economo neurons in the cetacean brain: distribution and quantification. *Soc. Neurosci. Abstr.* **34**, 79.14 (<http://www.sfn.org>).

354. Hof P.R., Butti C., Allman J.M., Hakeem A., Tetreault N.A., Carpenter D., Tang C.Y., Dickstein D.L., Harry S., Bonar C.J., Raghanti M., Sherwood C.C. (2008). The brain of the pygmy hippopotamus, *Hexaprotodon liberiensis* (Artiodactyla, Hippopotamidae): comparative histology, immunohistochemistry, and magnetic resonance imaging. *Soc. Neurosci. Abstr.* **34**, 79.24 (<http://www.sfn.org>).
355. Höistad M., Segal D., Carpenter D., Tang C.Y., Hof P.R. (2008) The effects of myelin deficiencies in mouse models of schizophrenia: studies in the MAG knockout and the Quaking mutant. *Soc. Neurosci. Abstr.* **34**, 254.25 (<http://www.sfn.org>).
356. Ng J., Tang C.Y., Eaves E.L., Kanelloupolou I., Mai X., Carpenter D., Hof P.R., Schroeder D.H., Condon C.A., Haier R.J. (2008) Gender differences in correlations of regional white matter integrity with intelligence factor scores. *Soc. Neurosci. Abstr.* **34**, 288.28 (<http://www.sfn.org>).
357. Eaves E.L., Tang C.Y., Ng J., Carpenter D., Hof P.R., Schroeder D.H., Condon C.A., Haier R.J. (2008) fMRI activations during n-back test correlate with intelligence factor scores differently in males and females. *Soc. Neurosci. Abstr.* **34**, 288.29 (<http://www.sfn.org>).
358. Carpenter D.M., Eaves E.L., Mai X., Hof P.R., Tang C.Y. (2008) Reproducibility of DTI image processing techniques. *Soc. Neurosci. Abstr.* **34**, 398.9 (<http://www.sfn.org>).
359. Stockton Jr. S.D., Hof P.R., Dickstein D.L. (2008) Alterations in dendritic morphology in layer II/III pyramidal neurons in the frontal cortex of htau mice. *Soc. Neurosci. Abstr.* **34**, 439.13 (<http://www.sfn.org>).
360. Hao J., Kaufmann J., Janssen W.G.M., Lou W., Hof P.R., Rapp P.R., Morrison J.H. (2008) Age-related synapse and spine loss in layer III pyramidal neurons of area 46 in female rhesus monkeys. *Soc. Neurosci. Abstr.* **34**, 475.8 (<http://www.sfn.org>).
361. Khvorostova Y., Barlow G., Dickstein D., Hof P.R., Crnic L.S., Patterson D., Town T., Galdzicki Z., Korenberg J.R. (2008) A new model of Down syndrome: human BAC transgenic for PCP4. *Soc. Neurosci. Abstr.* **34**, 493.14 (<http://www.sfn.org>).
362. Rapp P.R., Shamy J.L., Griesemer C.D., Roberts M.T., Hof P.R., Eberling J.L. (2008) Regionally selective decline in brain glucose metabolism in aged female rhesus macaques revealed by PET. *Soc. Neurosci. Abstr.* **34**, 593.3 (<http://www.sfn.org>).
363. Shamy J.L., Carpenter D.M., Fong S.G., Murray E.A., Tang C.Y., Hof P.R., Rapp P.R. (2008) Diffusion tensor imaging assessment of white matter tracts following hippocampal lesions in macaque monkeys. *Soc. Neurosci. Abstr.* **34**, 649.23 (<http://www.sfn.org>).
364. Sherwood C., Raghanti M., Stimpson C.D., Bonar C.J., Phillips K.A., Allman J.M., Erwin J.M., Hof P.R. (2008) Inhibitory interneurons and the evolution of human frontal cortex. *Soc. Neurosci. Abstr.* **34**, 682.24 (<http://www.sfn.org>).
365. Raghanti M., Erwin J.M., Hof P.R., Sherwood C.C. (2008) The distribution of tyrosine hydroxylase-immunoreactive neurons in prefrontal cortex of Old World monkeys, apes and humans. *Soc. Neurosci. Abstr.* **34**, 726.11 (<http://www.sfn.org>).

366. Ehlenberger D.B., Rodriguez A., Dickstein D.L., Hof P.R., Wearne S.L. (2008) A trainable system for classifying arbitrary dendritic spine types in 3D. *Soc. Neurosci. Abstr.* **34**, 798.3 (<http://www.sfn.org>).
367. De Souza A.A., Amunts K., Schleicher A., Hof P.R., Sherwood C.C., Zilles K. (2009) Hominoid brain organization: histometric analyses of striate and extrastriate areas. *Am. J. Phys. Anthropol. Suppl.* **47**, 116.
368. Gilissen E.P., Suliga M., Deklerck R., Nyssen E., Achten R., Erwin J.M., Hof P.R., Sherwood C.C. (2009) Sulcus topography and asymmetry of the common chimpanzee parietal cortex. *Am. J. Phys. Anthropol. Suppl.* **47**, 133-134.
369. Sherwood C.C., Raghanti M.A., Stimpson C.D., Spoerke M.A., Bonar C.J., Phillips K.A., Allman J.M., Erwin J.M., Hof P.R. (2009) Inhibitory interneurons and the evolution of human frontal cortex. *Am. J. Phys. Anthropol. Suppl.* **47**, 238.
370. Erwin J.M., Rose A.L., Patterson F., Hof P.R. (2009) Learning from Michael: what studies of brain and behavior teach us about the mind of a gorilla. *Am. J. Primatol.* **71** (Suppl. 1), 54.
371. Erwin J.M., Hof P.R. (2009) Ethical considerations regarding research involving chimpanzees (*Pan troglodytes*). *Am. J. Primatol.* **71** (Suppl. 1), 106.
372. Akram A., Hof P.R., Haroutunian V. (2009) Dementia severity-dependent dysregulation of components of the cholesterol trafficking machinery, ABCA1 and SCARB1, in AD brain. *Soc. Neurosci. Abstr.* **35**, 43.14 (<http://www.sfn.org>).
373. Peterson L.D., Hof P.R., Glaser J., Peterson D.A. (2009) Counting neural cells in tissue by high-throughput computer-assisted confocal stereology. *Soc. Neurosci. Abstr.* **35**, 104.4 (<http://www.sfn.org>).
374. Sharma Y., Allman J.M. Hof P.R., Manaye K. (2009) Stereological analysis of the hypothalamic hypocretin/orexin neurons in human and non-human primates. *Soc. Neurosci. Abstr.* **35**, 225.10 (<http://www.sfn.org>).
375. Midthune B., Tyan S.H., Eggert S., Dickstein D.L., Hof P.R., Koo E.H. (2009) Morphological and functional significance of the APP homologue, APLP2 and its role in A β toxicity. *Soc. Neurosci. Abstr.* **35**, 427.17 (<http://www.sfn.org>).
376. Walsh J.J., Shih A.Y.J., Eggert S., Hof P.R., Koo E.H., Tyan S.H., Dickstein D.L. (2009) Alterations in neuronal morphology of pyramidal neurons of the CA1, dentate gyrus, and prefrontal cortex of APP knockout mice. *Soc. Neurosci. Abstr.* **35**, 427.19 (<http://www.sfn.org>).
377. Hopkins W.D., Garrison A.R., Stimpson C.D., Erwin J.M., Hof P.R., Sherwood C.C. (2009) Wernicke's area homolog in chimpanzees (*Pan troglodytes*): probabilistic mapping, asymmetry, and comparison with humans. *Soc. Neurosci. Abstr.* **35**, 464.16 (<http://www.sfn.org>).
378. Hof P.R., Butti C., Romano T., Biancani B., Tuttle A.D., Sirpenski G., Rodriguez C.E., Bonar C.J., Marino L., Raghanti M.A., Sherwood C.C. (2009) The neocortical

- organization of Cetacea, Sirenia, and Carnivora: a comparative study. *Soc. Neurosci. Abstr.* **35**, 464.22 (<http://www.sfn.org>).
379. Butti C., Bauernfeind A.L., Spocer M.A., Marino L., Manger P.R., Wicinski B.A., Hoistad M., Bonar C.J., Raghanti M.A., Sherwood C.C., Hof P.R. (2009) The glia-neuron index in the neocortex of Cetartiodactyla and Afrotheria: implications for mammalian evolution. *Soc. Neurosci. Abstr.* **35**, 464.23 (<http://www.sfn.org>).
380. Brautigam H., Thomas C., Pedrini S., Schmeidler J., Ho L., Fraser P., Westaway D., St. George-Hyslop P., Pasinetti G.M., Dickstein D.L., Hof P.R., Ehrlich M.E., Gandy S. (2009) High protein diet is associated with lower brain weight in Alzheimer's mouse model: Evidence for role of caloric source in vulnerability to amyloid toxicity. *Soc. Neurosci. Abstr.* **35**, 725.12 (<http://www.sfn.org>).
381. Gu X., Liu X., Guise K.G., Hof P.R., Naidich T.P., Fan J. (2009) Stimulus-driven, but not task-driven, pain perception modulates visual processing of the human body. *Soc. Neurosci. Abstr.* **35**, 785.15 (<http://www.sfn.org>).
382. Villegas L., Coplan J.D., Tang C.Y., Mathew S.J., Martinez J., Hof P.R., Smith E.L.P., Dwork A.D., Perera T.D., Rosenblum L.A., Shungu D.C., Gelernter J., Kaffman A., Jackowski A., Kaufman J., Gorman J.M. (2009) Early life stress and brain connectivity: white matter deficits in variable foraging demand subjects. *Biol. Psychiatry* **65** (Suppl. 1), 435S-436S.
383. Jackowski A.P., Coplan J.D., Tang C.Y., Mathew S.J., Martinez J., Hof P.R., Smith E.L.P., Dwork A.D., Perera T.D., Pantol G., Carpenter D., Rosenblum L.A., Shungu D.C., Gorman J.M., Kaffman A., Gelernter J., Kaufman J. (2009) Serotonin transporter gene polymorphism (5-HTTLPR) and amygdala volume in nonhuman primates submitted to early life stress. *Biol. Psychiatry* **65** (Suppl. 1), 110S.
384. Barger N., Schumann C.M., Annese J., Sherwood C.C., Stefanacci L., Hof P.R., Semendeferi K. (2010) A comparative stereological analysis of neuron numbers in the human and non-human primate basal amygdala. *Am. J. Phys. Anthropol.* **Suppl. 50**, 61.
385. Bauernfeind A., Hof P.R., Sherwood C.C. (2010) Intraspecific volumetric comparison of insular regions based on cytoarchitectonics. *Am. J. Phys. Anthropol.* **Suppl. 50**, 62-63.
386. De Sousa A.A., Sherwood C.C., Mohlberg H., Amunts K., Scheleicher A., MacLeod C.E., Hof P.R., Frahm H., Zilles K. (2010) Hominoid visual brain structure volumes and the position of the lunate sulcus. *Am. J. Phys. Anthropol.* **Suppl. 50**, 92.
387. Strener K.N., Boddy A.M., Kuzawa C.W., Sherwood C.C., Hof P.R., Lipovich L., Grossman L.I., Uddin M., Wildman D.E., Goodman M., Mair-Meijers H.E., Weckle A.L., Gregoire L., Chugani H.T. (2010) Functional genomic signatures of human brain growth and development. *Am. J. Phys. Anthropol.* **Suppl. 50**, 223.
388. Stimpson C.D., Allman J.M., Tetreault N.A., Butti C., Hof P.R., Sherwood C.C. (2010) Variation of NMB and ATF3 protein expression in von Economo neurons of hominoids: implications for evolution of social cognition. *Am. J. Phys. Anthropol.* **Suppl. 50**, 223-224.
389. Miller D.J., Duka T., Stimpson C.D., Schapiro S.J., Baze W.B., McArthur M.J., Fobbs A.J., Wildman D.E., Erwin J.M., Hof P.R., Sherwood C.C. (2010) Development of myelinated

- axon length density and myelin-associated glycoprotein expression in the neocortex of chimpanzees compared to humans. *Soc. Neurosci. Abstr.* **36**, 440.11 (<http://www.sfn.org>).
390. Bozdagi O., Sakurai T., Patil S., Papapetrou D., Dickstein D.L., Takahashi N., Krug L., Wang X., Huntley G.W., Zhou Q., Hof P.R., Buxbaum J.D. (2010) Haploinsufficiency of Shank3 causes impairments in synaptic transmission and plasticity in the hippocampus. *Soc. Neurosci. Abstr.* **36**, 463.2 (<http://www.sfn.org>).
391. Hamzei-Sichani F., Simonyan K., Hof P., Koretsky A., Morris D. (2010) 3D X-ray computer tomography of excised rodent brain at submicrometric resolution using metallic intracellular contrast medium. *Soc. Neurosci. Abstr.* **36**, 516.20 (<http://www.sfn.org>).
392. Baizer J.S., Paolone N.A., Kramer V., Sherwood C., Hof P.R. (2010) Neurochemical organization of the chimpanzee vestibular brainstem. *Soc. Neurosci. Abstr.* **36**, 583.23 (<http://www.sfn.org>).
393. Walsh J.J., Tyan S.H., Midthune B., Eggert S., Hof P.R., Koo E., Dickstein D.L. (2010) Comparison of neuronal morphology in the prefrontal cortex of APP and APLP2 knockout mice. *Soc. Neurosci. Abstr.* **36**, 652.13 (<http://www.sfn.org>).
394. Raghanti M.A., Golden G.D., Watson S., Hof P.R., Sherwood C.C. (2010) Comparative analysis of the nucleus basalis of Meynert among primates. *Soc. Neurosci. Abstr.* **36**, 690.9 (<http://www.sfn.org>).
395. Barger N., Schumann C., Stefanacci L., Sherwood C., Annese J., Allman J., Hof P., Semendeferi K. (2010) A comparative, stereological analysis of neuron numbers in the amygdala and four amygdalar nuclei in humans, apes, and macaques. *Soc. Neurosci. Abstr.* **36**, 690.18 (<http://www.sfn.org>).
396. Yadav A., Weaver C.M., Gao Y.Z., Dickstein D.L., Luebke J.I., Hof P.R. (2010) Aged model neurons of the prefrontal cortex fire faster to maintain functional robustness in response to morphological dystrophy. *Soc. Neurosci. Abstr.* **36**, 745.6 (<http://www.sfn.org>).
397. Jacobs B.G., Borst J., Hannan M., Anderson K., Townshend C., Butti C., Sherwood C., Hof P.R., Manger P.R. (2010) African elephant (*Loxodonta africana*) neocortex: II. supragranular pyramidal neurons. *Soc. Neurosci. Abstr.* **36**, 900.8 (<http://www.sfn.org>).
398. Sherwood C.C., Jacobs B.G., Hannan M., Borst J., Anderson K., Janeway C., Butti C., Hof P.R., Manger P.R. (2010) African elephant (*Loxodonta africana*) neocortex: I. Neuromorphological characteristics of cortical neurons. *Soc. Neurosci. Abstr.* **36**, 900.9 (<http://www.sfn.org>).
399. Butti C., Raghanti M.A., Bonar C.J., Rodriguez C.E., Reidenberg J.S., Wicinski B.A., Stimpson C.D., Brake A.G., Bauernfeind A., Sherwood C.C., Hof P.R. (2010) The insular cortex: a comparative perspective. *Soc. Neurosci. Abstr.* **36**, 900.10 (<http://www.sfn.org>).
400. Bauernfeind A., De Sousa A.A., Avasthi T., Zilles K., Semendeferi K., Hof P.R., Sherwood C.C. (2010) A volumetric comparison of insular regions in anthropoid primates based on cytoarchitectonics. *Soc. Neurosci. Abstr.* **36**, 900.11 (<http://www.sfn.org>).

401. Duka T., Grossman L., Uddin M., Wildman D., Goodman M., Baze W., Hof P., Sherwood C. (2011) Distribution of synaptic markers in chimpanzee neocortical areas across development. *Am. J. Phys. Anthropol. Suppl.* **52**, 128-129.
402. Jia H., Lipovich L., Grossman L.I., Uddin M., Hof P., Sherwood C.C., Kuzawa C., Wildman D.E., Goodman M. (2011) Structural differences of orthologous brain-expressed genes between *Gorilla* and human revealed by high-throughput RNA sequencing. *Am. J. Phys. Anthropol. Suppl.* **52**, 178-179.
403. Lipovich L., Tarca A.L., Jia H., Grossman L.I., Uddin M., Hof P., Sherwood C.C., Kuzawa C., Wildman D.E., Goodman M. (2011) Human-specific brain energy utilization features are reflected in gene expression during childhood: and RNA-world perspective. *Am. J. Phys. Anthropol. Suppl.* **52**, 199.
404. Spocer M., Hopkins W., Bianchi S., Heymeyer A., Anderson S., Stimpson C., Fobbs A., Hof P., Sherwood C. (2011) Neuropil asymmetry in the cerebral cortex of humans and chimpanzees: implications for the evolution of unique cortical circuitry in the human brain. *Am. J. Phys. Anthropol. Suppl.* **52**, 281-282.
405. Raghanti M., Conley T., Erwin J.M., Hof P.R., Sherwood C.C. (2011) Neuropeptide Y-immunoreactive neurons in the cerebral cortex of humans and other anthropoid primates. *Soc. Neurosci. Abstr.* **37**, 39.17 (<http://www.sfn.org>).
406. Gama Sosa M.A., De Gasperi R., Janssen W.G., Hof P.R., Elder G.A. (2011) Regulation of neural progenitor cell differentiation by endothelial cells. *Soc. Neurosci. Abstr.* **37**, 131.21 (<http://www.sfn.org>).
407. Weinstock N., Hof P.R., Sherwood C.C., Witelson S.F., Baizer J.S. (2011) The nucleus paraphysis in monkey, man, and chimpanzee. *Soc. Neurosci. Abstr.* **37**, 183.08 (<http://www.sfn.org>).
408. Brautigam H., Dickstein D.L., Gandy S., Hof P.R., Ehrlich M.E. (2011) PS1Δ8 familial Alzheimer's mutation results in motor deficits, region-specific cell loss, and a total loss of all detectable γ-secretase activity. *Soc. Neurosci. Abstr.* **37**, 354.02 (<http://www.sfn.org>).
409. Shamy J.L., Avants B.B., Roberts M.T., Rowland D.J., Larson R., Gee J., Cherry S.R., Hof P.R., Morrison J.H., Rapp P.R. (2011) Longitudinal structural and basal metabolic changes in behaviorally characterized aged female rhesus monkeys. *Soc. Neurosci. Abstr.* **37**, 411.18 (<http://www.sfn.org>).
410. Janeway C., Townshend C., Butti C., Wicinski B., Hof P., Sherwood C., Jacobs B.G. (2011) Quantitative neuromorphology in cetacea: bottlenose dolphin (*Tursiops truncatus*), North Atlantic minke whale (*Balaenoptera acutorostrata acutorostrata*), and humpback whale (*Megaptera novaeangliae*). *Soc. Neurosci. Abstr.* **37**, 734.09 (<http://www.sfn.org>).
411. Yadav A., Dickstein D.L., Luebke J.I., Hof P.R., Weaver C.M. (2011) Maintaining robustness of firing in layer III pyramidal neurons: predictions for the hyperpolarization-activated current I_H in aging. *Soc. Neurosci. Abstr.* **37**, 766.23 (<http://www.sfn.org>).
412. Weaver C.M., Yadav A., Hof P.R., Luebke J.I. (2011) Model parameter predicts age-related changes in ion channel density in layer III pyramidal neurons. *Soc. Neurosci. Abstr.* **37**, 766.24 (<http://www.sfn.org>).

413. Spocter M.A., Duka T., Hopkins W.D., Anderson S., Collins Z., Stimpson C.D., Hof P.R., Sherwood C.C. (2011) Evaluating the pattern of neocortical synapse-associated protein expression and asymmetry in the common chimpanzee (*Pan troglodytes*). *Soc. Neurosci. Abstr.* **37**, 817.03 (<http://www.sfn.org>).
414. Duka T.I., Collins Z., Grossman L.I., Uddin M., Wildman D.E., Schapiro S.J., McArthur M.J., Baze W.B., Hof P.R., Sherwood C.C. (2011) The interplay between synaptic organization, mitochondrial density, and expression of neuronal glucose transporter, GLUT3, in chimpanzee neocortical development. *Soc. Neurosci. Abstr.* **37**, 817.12 (<http://www.sfn.org>).
415. Bianchi S., Stimpson C.D., Bauernfeind A.L., Schapiro S.J., Bae W.D., McArthur M.J., Hopkins W.D., Jacobs B., Hof P.R., Sherwood C.C. (2011) Delayed development of pyramidal neuron morphology in the prefrontal cortex of the chimpanzee: a Golgi study. *Soc. Neurosci. Abstr.* **37**, 817.18 (<http://www.sfn.org>).
416. Bianchi S., Steimpson C.D., Bauernfeind A.L., Hopkins W.D., Semendeferi K., Jacobs B., Hof P.R., Sherwood C.C. (2012) Regional specializations in the chimpanzee neocortex: pyramidal neurons are more branched and spiny in the prefrontal cortex. *Am. J. Phys. Anthropol. Suppl.* **54**, 99.
417. Duka T., Spocter M.A., Hopkins W.D., Anderson S., Collins Z., Stimpson C.D., Hof P.R., Sherwood C.C. (2012) Study on the lateral distribution in the expression of brain-specific proteins in the cerebral cortex in the common chimpanzee (*Pan troglodytes*). *Am. J. Phys. Anthropol. Suppl.* **54**, 135.
418. Raghanti M.A., Bohush T., Sudduth J., Erwin J.M., Hof P.R., Sherwood C.C. (2012) Species-specific distributions of cholinergic innervation in the neocortex of anthropoid primates. *Am. J. Phys. Anthropol. Suppl.* **54**, 242-243.
419. Chadwick B., Dickstein D.L., Veuthey T., Hof P.R., Baxter M.G., Hurd Y. (2012) Adolescent THC exposure induces immediate and long-term alterations in the dendritic branching complexity of medial prefrontal cortical pyramidal neurons. *Soc. Neurosci. Abstr.* **38**, 73.11 (<http://www.sfn.org>).
420. Eilam-Stock T., Xu P., Gu X., Van Dam N.T., Anagnostou E., Kolevzon A., Soorya L., Siller M., Hof P.R., Fan J. (2012) Abnormal association between spontaneous autonomic activity and brain fluctuations during resting state in autism spectrum disorders. *Soc. Neurosci. Abstr.* **38**, 245.18 (<http://www.sfn.org>).
421. Mufson E.J., Perez S.E., Mohammad N., Kramer L., Abrahamson E., Ikonomovic M.D., Erwin J.M., Sherwood C.C., Hof P.R., Raghanti M. (2012) Amyloid plaques but not classic neurofibrillary tangle pathology in the aged gorilla cortex. *Soc. Neurosci. Abstr.* **38**, 343.18 (<http://www.sfn.org>).
422. Uppal N., Minwalla L., Puri R., Bozdagi O., Janssen W.G., Dickstein D.L., Buxbaum J.D., Hof P.R. (2012) Ultrastructural changes in the CA1 of Shank3-deficient mice. *Soc. Neurosci. Abstr.* **38**, 443.19 (<http://www.sfn.org>).

423. Papapetrou D., Bozdagı O., Janssen W.G., Dickstein D.L., Buxbaum J.D., Hof P.R. (2012) Morphological correlates of synaptic plasticity in the Shank3-deficient mouse. *Soc. Neurosci. Abstr.* **38**, 444.12 (<http://www.sfn.org>).
424. Gu X., Van Dam N., Gao Z., Wang X., Liu X., Knight R., Hof P., Fan J. (2012) Cognition-emotion integration in the anterior insular cortex. *Soc. Neurosci. Abstr.* **38**, 627.05 (<http://www.sfn.org>).
425. Fan J., Xu P., Van Dam N.T., Eilam-Stock T., Gu X., Luo Y., Hof P.R. (2012) Resting state, idle mind: spontaneous brain activity relates to autonomic arousal. *Soc. Neurosci. Abstr.* **38**, 728.07 (<http://www.sfn.org>).
426. Sowa A.C., Steele J.W., Brautigam H., Short J., Frasier P.E., St. George-Hyslop P.H., Westaway D., Gandy S.E., Hof P.R., Dickstein D.L. (2012) Molecular and synaptic alterations result in early behavioral deficits in the TgCRND8 Alzheimer's mouse model. *Soc. Neurosci. Abstr.* **38**, 752.03 (<http://www.sfn.org>).
427. Harland T., Kennedy D., Johnson N., Wicinski B., Hof P.R., Sherwood C.C., Manger P.R., Schall M., Jacobs B.G. (2012) Neuromorphology of giraffe (*Giraffa camelopardalis*) visual and motor cortices. *Soc. Neurosci. Abstr.* **38**, 895.12 (<http://www.sfn.org>).
428. Duka T.I., Collins Z., Goldston J., Baker J.L., Grossman L.I., Wildman D.E., Baze W.B., Hof P.R., Sherwood C.C. (2012) Postnatal developmental changes in excitatory and inhibitory postsynaptic protein content and the ratio of excitatory-to-inhibitory synapses in chimpanzee cerebral cortex. *Soc. Neurosci. Abstr.* **38**, 895.13 (<http://www.sfn.org>).
429. Barks S.K., McFarlin S.C., Tocheri M.W., Massey J.S., Eriksen A.B., Fawcett K.A., Hof P.R., Bromage T.G., Mudakikwa A., Cranfield M.R., Sherwood C.C. (2012) Exceptionally rapid brain growth in wild Virunga gorillas (*Gorilla beringei beringei*). *Soc. Neurosci. Abstr.* **38**, 895.14 (<http://www.sfn.org>).
430. Raghanti M., Sudduth J., Bohush T., Erwin J.M., Hof P.R., Sherwood C.C. (2012) Humans and great apes share layer- and area-specific increases in cortical neuropeptide Y innervation. *Soc. Neurosci. Abstr.* **38**, 895.15 (<http://www.sfn.org>).
431. Baker J.L., Duka T., Maynard T., Wood B., Hof P.R., Ely J.J., Baze W.B., Schapiro S.J., Raghanti M., Lewandowski A., Wildman D.E., Sherwood C.C. (2012) The molecular evolution of NMDA receptors in the human lineage. *Soc. Neurosci. Abstr.* **38**, 895.16 (<http://www.sfn.org>).
432. Weaver C.M., Yadav A., Amatrudo J.M., Hof P.R., Luebke J.I. (2012) Modeling predicts that parameters shaping action potentials and synaptic responses differ in pyramidal neurons of the visual and prefrontal cortices. *BMC Neurosci.* **13(Suppl. 1)**, 61.
433. Barks S.K., Bauernfeind A.L., Hof P.R., Hopkins W.D., Raghanti M.A., Cranfield M.R., Mudakikwa A., De Sousa A.A., Zilles K., Sherwood C.C. (2013) Variable temporal-insular neuroanatomy in primates with attention to Eastern gorillas (*Gorilla beringei*). *Am. J. Phys. Anthropol.* **56**, 74.
434. Coskren P., Kabaso D., Wearne S.L., Yadav A., Hof P.R., Luebke J.I., Weaver C.M. (2013) Functional consequences of age-related morphologic changes in pyramidal neurons of the rhesus monkey prefrontal cortex. *BMC Neurosci.* **14(Suppl. 1)**, 245-256.

435. Raghanti M., Spurlock L.B., Treichler F.R., Heinrichs N.T., George J.C., Stimmelmayr R., Butti C., Thewissen J.G.M., Hof P.R. (2013) An analysis of von Economo neurons in the cerebral cortex of cetaceans, artiodactyls, and perissodactyls: emerging evidence for a phylogenetically ancient neuron type. *Soc. Neurosci. Abstr.* **39**, 173.13 (<http://www.sfn.org>).
436. Duka T.I., Collins Z., Anderson S.M., Raghanti M., Ely J.J., Hof P.R., Wildman D.E., Grossman L.I., Sherwood C.C. (2013) Synaptosomal LDH isoenzyme pattern in primate brain evolution: a comparative study between neocortex and striatum. *Soc. Neurosci. Abstr.* **39**, 195.08 (<http://www.sfn.org>).
437. Baizer J.S., Wong K., Hof P.R., Sherwood C.C., Witelson S.F. (2013) Degeneration of neurons in the principal nucleus of the inferior olive of the human: evidence from silver staining. *Soc. Neurosci. Abstr.* **39**, 469.16 (<http://www.sfn.org>).
438. Lee L., Johnson N., Waller L., Raghanti M., Lewandowski A., Kottwitz J.J., Roberts J.F., Manger P.R., Hof P.R., Sherwood C.C., Jacobs B.G. (2013) Neocortical neuronal morphology in the infant giraffe (*Giraffa camelopardalis tippelskirchi*) and infant African elephant (*Loxodonta africana*). *Soc. Neurosci. Abstr.* **39**, 795.11 (<http://www.sfn.org>).
439. Duka T., Collins Z., Grossman L.I., Uddin M., Wildman D.E., Schapiro S.J., McArthur M.J., Baze W.B., Hof P.R., Sherwood C.C. (2013) The interplay between synaptic reorganization, mitochondrial density, and expression of neuronal glucose transporter, GLUT3, in chimpanzee neocortical development. *Brain Behav. Evol.* **81**, 252-253.
440. Bauernfeind A.L., Soderblom E.J., Turner M.E., Moseley A.M., Ely J.J., Hof P.R., Sherwood C.C., Wray G.A., Babbitt C.C. (2014) Differential gene and protein expression in the human and chimpanzee brain: a comparison using high-throughput techniques. *Am. J. Phys. Anthropol. Suppl.* **58**, 73.
441. Duka T., Collins Z., Anderson S.M., Raghanti M.A., Ely J.J., Hof P.R., Wildman D.E., Grossman L.I., Sherwood C.C. (2014) Phylogenetic variation in subcellular distribution of isoenzyme composition of energy metabolism enzyme, lactate dehydrogenase, in primate brain evolution. *Am. J. Phys. Anthropol. Suppl.* **58**, 109.
442. Reyes L.D., Smaers J.B., Grinker O., Raghanti M.A., Zilles K., Hof P.R., Sherwood C.C. (2014) Reorganization of cerebral cortical layers in primates compared to other mammals. *Am. J. Phys. Anthropol. Suppl.* **58**, 221.
443. Sterner K.N., Chugani H.T., Tarca A.L., Sherwood C.C., Hof P.R., Kuzawa C.W., Abbas A., Lipovich L., Grossman L.I., Uddin M., Goodman M., Wildman D.E. (2014) Dynamic patterns of gene expression in the human brain during postnatal development. *Am. J. Phys. Anthropol. Suppl.* **58**, 246.
444. Rumbell T., Draguljic D., Luebke J., Hof P., Weaver C.M. (2014) Automatic fitness function selection for compartment model optimization. *BMC Neurosci.* **15(Suppl. 1)**, 5-6.
445. Rumbell T., Dragulic D., Luebke J.I., Hof P.R., Weaver C.M. (2014) Compartmental model optimization predicts altered channel densities and kinetics in aged versus young pyramidal neurons of rhesus monkey prefrontal cortex. *Soc. Neurosci. Abstr.* **40**, 372.22 (<http://www.sfn.org>).

446. Duka T.I., Baker J., Collins Z., Anderson S.M., Raghanti M., Ely J.J., Hof P.R., Wildman D.E., Grossman L.I., Sherwood C.C. (2014) AMPA receptor GluR2 subunit expression level is upregulated in synapses of the cerebral cortex across primates. *Soc. Neurosci. Abstr.* **40**, 446.16 (<http://www.sfn.org>).
447. Phillips K.A., Stimpson C.D., Smaers J.B., Raghanti M., Popratiloff A., Hof P.R., Sherwood C.C. (2014) Biophysical constraints on the processing speed of axons conveyed by the corpus callosum: possible role in the evolution of hemispheric asymmetry. *Soc. Neurosci. Abstr.* **40**, 446.23 (<http://www.sfn.org>).
448. Jacobs B.G., Johnson N.L., Wahl D., Johnson C.B., Mohr D., Kopec B., Schall M., Maseko B.C., Lewandowski A.H., Raghanti M.A., Wicinski B., Butti C., Hopkins W.D., Bertelsen M.F., Walsh T., Roberts J.R., Reep R.L., Hof P.R., Sherwood C.C., Manger P.R. (2014) Comparative neuronal morphology of the cerebellar cortex in afrotherians, carnivores, cetartiodactyls, and primates. *Soc. Neurosci. Abstr.* **40**, 499.02 (<http://www.sfn.org>).
449. Charvet C.J., van der Kouwe A., Hopkins W.D., Hof P.R., Sherwood C.C., Takahashi E. (2014) Evo-devo and the cortical connectome highlights systematic changes in frontal connections across primates. *Soc. Neurosci. Abstr.* **40**, 499.03 (<http://www.sfn.org>).
450. Bauernfeind A.L., Reyzer M.L., Caprioli R.M., Ely J.J., Babbitt C.C., Wray G.A., Hof P.R., Sherwood C.C. (2014) High spatial resolution proteomic comparison of the brain in humans and chimpanzees. *Soc. Neurosci. Abstr.* **40**, 795.11 (<http://www.sfn.org>).
451. Stimpson C.D., Hopkins W.D., Taglialatela J.P., Barger N., Hof P.R., Sherwood C.C. (2014) Differences in serotonin transporter expression in the amygdala of bonobos (*Pan paniscus*) and chimpanzees (*Pan troglodytes*): implications for behavior. *Soc. Neurosci. Abstr.* **40**, 499.07 (<http://www.sfn.org>).
452. Munger E.L., Edler M.K., Hof P.R., Hopkins W.D., Erwin J.M., Sherwood C.C., Raghanti M.A. (2014) Age-related neural changes in the chimpanzee hippocampus. *Soc. Neurosci. Abstr.* **40**, 499.08 (<http://www.sfn.org>).
453. Sherwood C., Takahashi E., van der Kouwe A., Hopkins W.D., Hof P.R., Charvet C.J. (2014) Evo-devo of cortical association pathways: allometric and systematic variation across primates. *Soc. Neurosci. Abstr.* **40**, 499.10 (<http://www.sfn.org>).
454. Janssen W.G., Hamzei-Sichani F., Zinn J.C., Evans J., Sharan A.D., Sperling M.R., Simonyan K., Hof P.R., Morrison J.H. (2014) Pyramidal cell morphology in human cortical dysplasia. *Soc. Neurosci. Abstr.* **40**, 606.13 (<http://www.sfn.org>).
455. Hamzei-Sichani F., Zinn J.C., Janssen W.G.M., Evans J., Sharan A.D., Sperling M.R., Simonyan K., Hof P.R., Morrison J.H. (2014) Pyramidal cell morphology in seizure onset zone, seizure spread zone, and silent cortical areas in patients with parietal lobe epilepsy. *Soc. Neurosci. Abstr.* **40**, 606.15 (<http://www.sfn.org>).
456. Zinn J.C., Janssen W.G.M., Evans J., Sharan A.D., Sperling M.R., Simonyan K., Hof P.R., Morrison J.H., Hamzei-Sichani F., (2014) Morphometric analysis of human pyramidal neurons of Brodmann areas 39 and 40. *Soc. Neurosci. Abstr.* **40**, 785.24 (<http://www.sfn.org>).

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA

IN RE: NATIONAL FOOTBALL LEAGUE
PLAYERS' CONCUSSION INJURY
LITIGATION

No. 2:12-md-02323-AB
MDL No. 2323

Kevin Turner and Shawn Wooden,
*on behalf of themselves and
others similarly situated,*

Civil Action No. 2:14-cv-00029-AB

Plaintiffs,

v.

National Football League and
NFL Properties, LLC,
successor-in-interest to
NFL Properties, Inc.,

Defendants.

THIS DOCUMENT RELATES TO:
ALL ACTIONS

DECLARATION OF JING ZHANG

Jing Zhang affirms under penalty of perjury the truth of the following facts:

1. I am Jing Zhang. My *curriculum vitae* is attached as Exhibit A.
2. I have been asked to submit this declaration in support of the objection to the proposed class action settlement in the above captioned case filed by the MoloLamken LLP law firm. I am not being compensated for my work in doing so.
3. Chronic traumatic encephalopathy (or CTE) is a unique neurodegenerative disease; it is not the same as amyotrophic lateral sclerosis (ALS), Alzheimer's disease, or Parkinson's disease.
4. Repetitive brain trauma is a necessary condition for developing CTE.

5. ALS, Alzheimer's disease, and Parkinson's disease are found in the general population of individuals who have not typically suffered repetitive brain trauma. Also, suicidality does not typically present as a main symptom of these diseases.

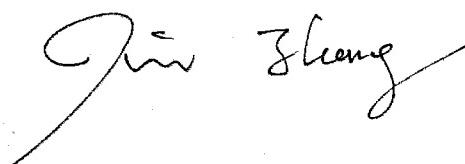
6. Mood and behavioral impairments such as depression, suicidality, hopelessness, impulsivity, explosiveness, rage, and aggression, although present in the general population, appear more frequently in individuals suffering from CTE than in the general population.

7. The mood and behavioral impairments associated with CTE can present prior to the onset of CTE-related dementia and can be the cause of significant disability and distress for the patient.

8. Based on my experience and knowledge of the clinical and scientific literature, I believe that a reliable, valid, and clinically accepted diagnosis of CTE, based, in part, on objective biomarkers, will likely be possible in the next decade, if not sooner, and long before the 65-year term of the proposed NFL Concussion Litigation Settlement expires.

Pursuant to 28 U.S.C. § 1746, I state under penalty of perjury that the foregoing is true and correct.

Dated: November 19, 2014



Jing Zhang , MD, PhD

Exhibit A

July, 2014

Curriculum Vitae

Personal Information:

Name: Jing Zhang, MD, PhD
Place of birth: Beijing, China
Citizenship: American
Current Position: Director, UW Medicine Neuropathology
Endowed Chair, Neuropathology
Professor of Pathology
Adjunct Professor of Neurology, Ophthalmology and Oral Health Sciences, University of Washington School of Medicine

Address: Department of Pathology, School of Medicine
University of Washington
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Mercer Island, WA 98040

Phone: 206-897-5245 (Research) ; 206-744-6171 (Clinic)
206-897-5707 (Lab. Manager) ; 206-744-6776 (Secretary)

Fax: 206-897-5249

E-mail: zhangj@u.washington.edu

Web: <http://www.pathology.washington.edu/research/labs/zhang/>

Education:

Aug. 1979 – June 1984 Medicine, Second Military Medical University, Shanghai, China

Aug. 1984 –June 1987 Graduate Student, Dept. of Diving Physiology, Second Military Medical University, Shanghai, China

Feb. 1990 – May 1996 Ph.D. Student, Dept. of Cell Biology, and Research Associate, Dept. of Medicine, Duke University, Durham, NC

July 1996 – Feb. 2001 Combined Anatomic Pathology/Neuropathology Program, Dept. of Pathology, Vanderbilt University Medical Center, Nashville, TN

July 1998 – June 1999 Ocular Pathology, Dept. of Pathology, Vanderbilt University Medical Center, Nashville, TN

Feb. 2000 Fellowship in Ophthalmic Pathology, Armed Forces Institute of Pathology

Faculty Position Held:

03/01-06/02	Assistant Professor and Attending pathologist, Departments of Pathology & Ophthalmology, Vanderbilt University, Nashville, TN
07/02-06/06	Assistant Professor, Department of Pathology, and Adjunct Assistant Professor of Ophthalmology, University of Washington (UW), Seattle, WA
07/02-present	Attending pathologist, Department of Pathology, UW, Seattle, WA
07/06-06/10	Associate Professor of Pathology and Adjunct Associate Professor of Ophthalmology, UW, Seattle, WA
07/10-	Professor of Pathology and Adjunct Professor of Neurology and Ophthalmology, UW, Seattle, WA
07/02-present	Director of Ophthalmic Pathology Service, UW, Seattle, WA
07/02-present	Associate Medical Staff Member, Seattle Cancer Care Alliance, Seattle, WA
03/04-06/10	Faculty Supervisor of Neuropathology Histology Laboratory, UW, Seattle, WA
12/02-04/09	Shaw Endowed Professorship in Investigative Neuropathology, UW, Seattle, WA
05/09	Shaw Endowed Chair in Neuropathology, UW, Seattle, WA
07/10-present	Acting and then official Director, Neuropathology, UW School of Medicine, Seattle, WA

Medical Licenses and Board Certification:

Aug. 2000	Tennessee Medical License (retired)
July, 2002	Washington Medical License (active)
Nov. 2001	Board-certified in Anatomic Pathologist and Neuropathology

Professional Interests:

Clinical Interests:	Neuropathology and Ocular Pathology
Research Interests:	Neurodegenerative disorders, Parkinson's disease in particular, biomarkers, oxidative damage and mitochondrial dysfunction

Research Funding:**Active projects:**

- 1) RO1 (NS057567) NIH, Biomarkers for Preclinical Parkinson's disease (2008-2014; Role: PI)
- 2) RO1 (AG033398) NIH, Post-translational Modifications of Proteins in Parkinson's disease (2008-2014; Role: PI)
- 3) P42 (ES004696) NIH, Biomarkers of neurotoxicants (2009-2014; Role: Project Leader; PI for SuperFund: Checkoway)
- 4) RO1 (ES019277) NIH, Interaction of α -synuclein & neurotoxicants with Mac1-NADPH oxidase (2011-2016; Role: PI)

- 5) P01 (NS062684) NIH, Cognitive impairment in Parkinson's disease
(2009-2014; Role: Core Leader; PI: Montine)
- 6) RO1 (ES016873) NIH, Microglial PHOX Activity in Parkinson's Disease
(2010-2015; Role: PI)
- 7) P30ES007033 NIH, Center for Ecogenetics & Environmental Health
(2011-2016; Role: Director of Functional Genomics and Proteomics Laboratory;
PI: Eaton)
- 8) K99 (ES017477) NIH, VMAT-2 as a mediator of PBDE Neurotoxicity
(2009-2014; Role: Mentor of Dr. Michael Caudle)
- 9) Nature Science Foundation of China - Microglial activation in Parkinson's disease
(2009-2016; Role: PI; Co-PI: Chen)
- 10) U01 (1U01NS082137) Large Scale Biomarker Discovery and Validation for
Parkinson Disease
(2012-2017; Role: PI)

Finished research funding since came to the University of Washington:

APDA: American Parkinson Disease Association

AFAR: American Federation for aging research

MJFF: Michael J. Fox Foundation

PDF: Parkinson Disease Foundation

- 1) MJFF Biomarker discovery for Parkinson's disease
(2005-2007; Role: PI)
- 2) PDF DATATOP CSF study
(2007-2008; Role: PI)
- 3) K08 (ES00383) NIH, Dithiocarbamate Pesticides in Parkinson's Disease
(PI, 2001-2004)
- 4) P30 (ES00267) NIH, Pilot grant: Proteomic Studies in Parkinson's Disease
(PI, 2002-2003 - Center grant PI - Guengerich)
- 5) STTR (Ey14089) NIH, Amniotic Membrane Contact Lens to Reduce Corneal
Scar
(Co-PI, 2002-2003; PI: Wang)
- 6) AFAR Proteomic Analysis of Proteins related to Inflammation in
Parkinson's Disease
(2004; Role: Mentor of Dr. Patrick McLaughlin)
- 7) R01 (ES10196) NIH, Catechol Thioethers in Parkinson's Disease
(2000-2005; Role: Co-I; PI: Montine)
- 8) APDA Proteomic mapping of midbrain
(2005-2006; Role: PI)
- 9) PDF Role of EP2 in Parkinson's disease
(2005-2006; Role: Mentor for Dr. Jinghua Jin)
- 10) PDF Proteomic analysis of EP2 mice in Parkinson's disease
(2005-2006; Role: Mentor for Ms. Angela Hagt)
- 11) RO1 (ES012703) NIH, Proteomic Studies in Parkinson's Disease
(2004-2009; Role: PI)
- 12) Michael J. Fox Found. Isoforms of α-synuclein in Parkinson's disease
(2008-2009; Role: PI)

- 13) R21 (NS060252) NIH, Detecting biomarkers in plasma for diagnosing neurodegenerative diseases (2007-2009; Role: PI)
- 14) APDF VMAT2 in Parkinson's disease (2008-2009; Role: Mentor of Dr. Michael Caudle)
- 15) RO1 (AG025327) NIH, Biomarkers for Parkinson's disease and Dementia (2004-2010; Role: PI)
- 16) R21 (DE17634) Detecting biomarkers in saliva for GVHD (2008-2010; Role: Co-I; PI: Izutsu)
- 17) P50 (AG05136) NIH, Alzheimer's Disease Research Center/Neuropath Core (05/31/05-04/30/10; Role: Autopsy and neuropathological service)
- 18) R21 (ES017504) NIH, Neuropathology of Chronic Manganese Exposure (2009-2012; Role: Co-I; PI: Racette)
- 19) FOX Foundation (2011-2012; Role: PI)
 - A) Salivary synuclein and DJ-1 as Parkinson's biomarkers
 - B) DATATOP Biomarkers

Teaching:

- 1. Course Director (2004-2010): PATH 513 Molecular Basis of Neurodegeneration
- 2. Instructor for Neuropathology Section (2005-2009), HUBIO 546
- 3. Faculty member, the Graduate Program in Neurobiology & Behavior at the UW (since 2005)
- 4. Faculty member, the Graduate Program in Pathology at the UW (since 2005)

Committees:

A) Grants:

- 1. NIH Study Section, charter member for Clinical Neurotransmission and Neuroplasticity (CNNT, since 2006)
- 2. NSD-B: Starting in 2014
- 3. Ad hoc member for:
 - a. The National Institute of Environmental Health Sciences (since 2004)
 - b. Clinical Neuroscience and Disease (CND, since 2005)
 - c. The U.S. Army Medical Research and Materiel Command (USAMRMC, since 2004)
 - d. National Nature Science Foundation, China (since 2006)

B) Editorial Boards:

- 1. American Journal of Pathology (2015 -)
- 2. Brain Pathology (since 2008)
- 3. Clinical Medicine: Geriatrics (since 2007)
- 4. Journal of Alzheimer Disease (2005-2008; 2014)
- 5. Proteomics Insights (since 2008)
- 6. Neurochemical Research (2006-2013)
- 7. Neurological Disease (since 2006)
- 7. PlosOne (Starting 2015)

C) Ad hoc reviewers:

1. Annals of Neurology
2. Archives of Neurology
3. Brain Research
4. FASEB J
5. Glia
6. Journal of Chemical Toxicology
7. Journal of Experimental Neurology
8. Journal of Neurochemistry
9. Journal of Neuropathology and Experimental Neurology
10. Journal of Neuroscience
11. Journal of Neurotoxicology
12. Journal of Proteomics Research
13. Lancet Neurology
14. Molecular Cellular Proteomics
15. Nature Neuroscience
16. Neurology
17. Neurobiology of Aging
18. Neuropathology and Experimental Neurobiology
19. Science
20. Proteomics
21. Toxicology Letters

D) Others:

- 1) Task Force of Board Member: Parkinson's Biomarkers: NIH (NINDS)
- 2) Biomarker Task force of Board Member: Fox Foundation
- 3) Board member of scientific program (2009-2011): American Society for Investigative Pathology (ASIP)
- 4) Co-Chair 92013-2014), Parkinson's disease Biomarker Program (PDBP), NIHDS, NIH
- 5) Member of Neuropathology Tissue Usage Center at University of Washington, Seattle, WA (since 2006)
- 6) Guest Professor, JiaoTong University School of Medicine, Shanghai, China (since 2008)

Memberships:

American Association of Neuropathologists
American Society for Investigative Pathology
College of American Pathologists
Neuroscience

Fellowship and Honors:

Fellowship in Hyperbaric Medicine, Feb. 1989 – Jan. 1990, Duke University Medical Center

Travel award to attend an International Conference on Parkinson's Disease, June 1999, Center of Excellence for Parkinson's Disease, Vanderbilt University Medical Center.

Alzheimer's Award (2007) see http://www.j-alz.com/award/award_2007.html for more details

Invited talks (only those since 2008 are listed)

- 1) Early diagnosis of Parkinson's disease - Emory University, Atlanta, March, 2008
- 2) Current proteomic analysis of biomarkers for neurodegenerative diseases - Eli Lilly, Indianapolis, April, 2008
- 3) Biomarkers for Parkinson's disease and progression - Parkinson Study Group (PSG) Annual Meeting, San Diego, May, 2008
- 4) Biomarkers for neurodegenerative diseases - University of Ottawa, Ottawa, June, 2008
- 5) Biomarkers for neurodegenerative diseases: an update - Grand Rounds, Neurosurgery, University of Washington, July, 2008
- 6) Introduction to proteomic discovery of biomarkers - McLean Hospital (Harvard University), August, 2008
- 7) Isoforms of alpha-synuclein in Parkinson's disease - Lausanne, Switzerland, September, 2008
- 8) Biomarkers in human cerebrospinal fluid - Educational workshop in Brain Tumor Founders Meeting, St. Louis, October, 2008
- 9) Biomarkers related to Parkinson's dementia, Kassel, Germany, March, 2009
- 10) Biomarkers for neurodegenerative diseases - A proteomic approach, UCSD, San Diego, April, 2009
- 11) Proteomics of cerebrospinal fluid, Rotterdam, Netherland, May 2009
- 12) Targeted and unbiased biomarker discovery for neurodegenerative diseases, Shanghai Jiao Tong University, July 2009
- 13) Update on synuclein isoforms as Parkinson's biomarker, Beijing, July 2009
- 14) 2009 Annual Symposium, Harvard Medical School, Boston, Nov, 2009
- 15) Unbiased and targeted discovery of biomarkers for Alzheimer's and Parkinson's disease, Huntington's Institute, Pasadena, March, 2010
- 16) Biomarkers for Parkinson's disease, American Society of Investigative Pathology, Anaheim, April, 2010
- 17) Biomarkers for Lewy body disease, NIH workshop, Washington DC, May, 2010
- 18) Looking ahead - Novel markers for Parkinson's disease, Buenos Aires, Argentina, June, 2010
- 19) LRRK2 as a model for PD biomarker discovery, Ribeirao, Brazil, June, 2010
- 20) Update on Parkinson's biomarkers, Glasgow, Scotland, September, 2010

- 21) Biomarkers for neurodegenerative disease, Aarhus, Denmark, September, 2010
- 22) Biomarkers for neurodegenerative disease, Trondheim, Norway, September, 2010
- 23) Biomarkers for neurodegenerative disease, Lund, Sweden, September, 2010
- 24) Panel of markers for Parkinson's disease, Tuebingen, Germany, November, 2010
- 25) Salivary biomarkers for neurodegenerative diseases - A new direction? Oral Biology, Seattle, WA, March, 2011
- 25) Panel of markers for pre-motor Parkinson's disease, Tuebingen, Germany, May, 2011
- 26) Salivary synuclein and DJ-1 for Parkinson's disease, Annul PSG meeting, Irving, TX, May, 2011
- 27) Biomarkers for Parkinson's disease - Quest for the Holy Grail? Keystone lecture at NIH, June, 2011
- 28) Proteomic studies of neurodegenerative disease - Proteomics and Aging Workshop, Seattle, WA, June, 2011
- 29) Biomarker for Huntington's disease - Task Force Workshop - Denver, CO, October, 2011
- 30) Biomarkers for Parkinson's disease - Parkinson's Congress, Shanghai, December, 2011.
- 31) Updates on premotor Parkinson's biomarkers - Pacific Northwest Basal Ganglia Coterie, Seattle, Washington, May, 2012
- 32) Translational Neuroscience, Yichun, NingXia, China, July, 2012
- 33) Molecular diagnosis of Alzheimer's and Parkinson's disease - from bench to bedside, Shanghai, China, September, 2012.
- 34) DATATOP Parkinson's biomarkers - New York, FOX with the New York Academy of Sciences, December, 2012
- 35) α -Synuclein in Parkinson's disease and related neurodegenerative diseases: From mechanisms to therapeutic strategies. Dubai, March, 2013
- 37) Updates on Parkinson's biomarkers, University of Padua, Italy, June 2013
- 38) Future Treatment Avenues in Parkinson's disease, Bordeaux, France, September, 2013
- 39) Futures of Biomarkers, NIH workshop, Bethesda, Feb, 2014/10/13
- 40) Brain banking and CNS biomarkers, Chongsa and Beijing, respectively, April, 2014.
- 41) Application of α -synuclein and its variants as biomarkers of Parkinsonism, Bangkok, Oct, 2014

42) Non-imaging biomarkers of MSA, Las Vegas , Nov, 2014

Publications:

- Shi M, Liu C, Cook TJ, Bullock KM, Zhao Y, Ginghina C, Li Y, Aro P, Dator R, He C, Hipp MJ, Zabetian CP, Peskind ER, Hu SC, Quinn JF, Galasko DR, Banks WA, **Zhang J.** Plasma exosomal α -synuclein is likely CNS-derived and increased in Parkinson's disease. *Acta Neuropathol.* 2014 Jul 6. [Epub ahead of print]
- Mattsson N, Insel P, Tosun D, **Zhang J**, Jack CR Jr, Galasko D, Weiner M; Alzheimer's Disease Neuroimaging Initiative. Effects of baseline CSF α -synuclein on regional brain atrophy rates in healthy elders, mild cognitive impairment and Alzheimer's disease. *PLoS One.* 2013 Dec 31;8(12):e85443. doi: 10.1371
- Pan C, Zhou Y, Dator R, Ginghina C, Zhao Y, Movius J, Peskind E, Zabetian CP, Quinn J, Galasko D, Stewart T, Shi M, **Zhang J.** Targeted Discovery and Validation of Plasma Biomarkers of Parkinson's Disease. *J Proteome Res.* 2014 Jun 11. [Epub ahead of print]
- Li G, Millard SP, Peskind ER, **Zhang J**, Yu CE, Leverenz JB, Mayer C, Shofer JS, Raskind MA, Quinn JF, Galasko DR, Montine TJ. Cross-sectional and longitudinal relationships between cerebrospinal fluid biomarkers and cognitive function in people without cognitive impairment from across the adult life span. *JAMA Neurol.* 2014 Jun;71(6):742-51.
- Stewart T, Liu C, Ginghina C, Cain KC, Auinger P, Cholerton B, Shi M, **Zhang J**; Parkinson Study Group DATATOP Investigators. Cerebrospinal Fluid α -Synuclein Predicts Cognitive Decline in Parkinson Disease Progression in the DATATOP Cohort. *Am J Pathol.* 2014 Apr;184(4):966-75. doi: 10.1016/j.ajpath.2013.12.007. Epub 2014 Mar 11.
- Su Z, Wang X, Gao X, Liu Y, Pan C, Hu H, Beyer RP, Shi M, Zhou J, **Zhang J**, Serra AJ, Wüthrich RP, Mei C. Excessive activation of the alternative complement pathway in autosomal dominant polycystic kidney disease. Article first published online: 2 MAR 2014 DOI: 10.1111/joim.12214
- Devic I, Shi M, Schubert MM, Lloid M, Izutsu KT, Pan C, Missaghi M, Morton TH, Mancl LA, **Zhang J**, Presland RB. Proteomic Analysis of Saliva from Patients with Oral Chronic Graft-Versus-Host Disease. *Biology of Blood and Marrow Transplantation*, 2014
- Stewart T, Sui YT, Gonzalez-Cuyar LF, Wong DT, Akin DM, Tumas V, Aasly J, Ashmore E, Aro P, Ginghina C, Korff A, Zabetian CP, Leverenz JB, Shi M, **Zhang J.** Cheek cell-derived α -synuclein and DJ-1 do not differentiate Parkinson's disease from control. *Neurobiol Aging.* 2014 Feb;35(2):418-20. doi: 10.1016/j.neurobiolaging.2013.08.008. Epub 2013 Sep 13.

Toledo JB, Korff A, Shaw LM, Trojanowski JQ, **Zhang J.** CSF α -synuclein improves diagnostic and prognostic performance of CSF tau and A β in Alzheimer's disease. *Acta Neuropathol.* 2013 Jun 29. [Epub ahead of print]

Peskind E, Petrie E, Cross D, Li G, Mayer C, Minoshima S, **Zhang J.**, Montine T, Raskind M. Cerebrospinal fluid biomarkers and PET imaging of cerebral glucose metabolism in Iraq and Afghanistan veterans: Converging evidence of brain dysfunction and neurodegeneration.

Mattison HA, Nie H, Gao H, Zhou H, Hong JS, **Zhang J.** Suppressed pro-inflammatory response of microglia in CX3CR1 knockout mice. *J Neuroimmunol.* 2013 Apr 15;257(1-2):110-5. doi: 10.1016/j.jneuroim.2013.02.008. Epub 2013 Mar 15

Gonzalez-Cuyar LF, Nelson G, Criswell SR, Ho P, Lonzanida JA, Checkoway H, Seixas N, Gelman BB, Evanoff BA, Murray J, **Zhang J.**, Racette BA. Quantitative neuropathology associated with chronic manganese exposure in South African mine workers. *Neurotoxicology.* 2013 Dec 26. pii: S0161-813X(13)00189-7. doi: 10.1016/j.neuro.2013.12.008.

Mattsson N, Insel P, Tosun D, **Zhang J.**, Jack CR Jr, Galasko D, Weiner M, Alzheimer's Disease Neuroimaging Initiative. Effects of baseline CSF α -synuclein on regional brain atrophy rates in healthy elders, mild cognitive impairment and Alzheimer's disease. *PLoS One.* 2013 Dec 31;8(12):e85443. doi: 10.1371/journal.pone.0085443. eCollection 2013.

Hanson AJ, Bayer-Carter JL, Green PS, Montine TJ, Wilkinson CW, Baker LD, Watson GS, Bonner LM, Callaghan M, Leverenz JB, Tsai E, Postupna N, **Zhang J.**, Lampe J, Craft S. Effect of Apolipoprotein E Genotype and Diet on Apolipoprotein E Lipidation and Amyloid Peptides: Randomized Clinical Trial. *JAMA Neurol.* 2013 Jun 17:1-9. doi: 10.1001/jamaneurol.2013.396. [Epub ahead of print]

Zhang J., Mattison HA, Liu C, Ginghina C, Auinger P, McDermott MP, Stewart T, Kang UJ; The Parkinson Study Group DATATOP Investigators, Cain KC, Shi M. Longitudinal assessment of tau and amyloid beta in cerebrospinal fluid of Parkinson disease. *Acta Neuropathol.* 2013 May 4. [Epub ahead of print]

Korff A, Liu C, Ginghina C, Shi M, **Zhang J.**. α -Synuclein in Cerebrospinal Fluid of Alzheimer's Disease and Mild Cognitive Impairment. *J Alzheimers Dis.* 2013 Apr 19. [Epub ahead of print]

Shi M, Hwang H, **Zhang J.** Quantitative characterization of glycoproteins in neurodegenerative disorders using iTRAQ. *Methods Mol Biol.* 2013;951:279-96

Wang Y, Shi M, Chung KA, Zabetian CP, Leverenz JB, Berg D, Srulijes K, Trojanowski JQ, Lee VMY, Siderowf AD, Hurtig H, Litvan I, Schiess MC, Peskind ER, Masuda M, Hasegawa M, Lin XM, Pan C, Galasko D, Goldstein DS, Jensen PH, Yang H, Cain KC, and **Zhang J.** Phosphorylated α -synuclein in

Parkinson disease and related parkinsonism; *Science (Translational Medicine)*; 2012 Feb 15;4(121):121ra20.

Racette BA, Criswell SR, Lundin JI, Hobson A, Seixas N, Kotzbauer PT, Evanoff BA, Perlmutter JS, **Zhang J**, Sheppard L, Checkoway H. Increased risk of parkinsonism associated with welding exposure. *Neurotoxicology*. 2012 Oct;33(5):1356-61. doi: 10.1016/j.neuro.2012.08.011.

Mollenhauer B, **Zhang J**. Biochemical premotor biomarkers for Parkinson's disease. *Mov Disord*. 2012 Apr 15;27(5):644-50. doi: 10.1002/mds.24956.

Lock EA, **Zhang J**, Checkoway H. Solvents and Parkinson disease: A systematic review of toxicological and epidemiological evidence. *Toxicol Appl Pharmacol*. 2012 Dec 7. pii: S0041-008X(12)00497-8. doi: 10.1016/j.taap.2012.11.016.

Haas BR, Stewart TH, **Zhang J**. Premotor biomarkers for Parkinson's disease - a promising direction of research. *Transl Neurodegener*. 2012 May 31;1(1):11

Lin X, Cook TJ, Zabetian CP, Leverenz JB, Peskind ER, Hu SC, Cain KC, Pan C, Edgar JS, Goodlett DR, Racette BA, Checkoway H, Montine TJ, Shi M, **Zhang J**. DJ-1 isoforms in whole blood as potential biomarkers of Parkinson disease. *Sci Rep*. 2012;2:954. doi: 10.1038/srep00954. Epub 2012 Dec 11.

Mattison HA, Stewart T, **Zhang J**. Applying bioinformatics to proteomics: is machine learning the answer to biomarker discovery for PD and MSA? *Mov Disord*. 2012 Nov;27(13):1595-7

Wang J, Hoekstra JG, Zuo C, Cook TJ, **Zhang J**. Biomarkers of Parkinson's disease: current status and future perspectives. *Drug Discov Today*. 2012 Sep 11. pii: S1359-6446(12)00304-2. doi: 10.1016/j.drudis.2012.09.001.

Nelson G, Criswell SR, **Zhang J**, Murray J, Racette BA. Research capacity development in South African manganese mines to bridge exposure and neuropathologic outcomes. *Neurotoxicology*. 2012 Jan 31. [Epub ahead of print]

Shi M, Sui YT, Peskind ER, Li G, Hwang H, Devic I, Ginghina C, Edgar JS, Pan C, Goodlett DR, Furay AR, Gonzalez-Cuyar FS, **Zhang J**, Salivary tau species are potential biomarkers of Alzheimer disease. *J Alzheimers Dis*. 2011 Aug 12. [Epub ahead of print]

Shi M, Furay A, Sossi V, Aasly JO, Armaly J, Wang Y, Wszolek ZK, Uitti RJ, Hasegawa K, Yokoyama T, Zabetian CP, Leverenz JB, Stoessl AJ, and Zhang J, DJ-1 and αSYN in LRRK2 CSF do not correlate with striatal dopaminergic function. *Neurobiol Aging*. 2011 Oct 20. [Epub ahead of print]

Shi M, **Zhang, J**. Cerebrospinal fluid α-synuclein, tau and amyloid β in Parkinson's disease. *Lancet Neurology*, July 18 online, 2011.

Hoekstra JG, Montine KS, **Zhang J**, Montine TJ, Mitochondrial therapeutics in Alzheimer's disease and Parkinson's disease, *Alzheimers Res Ther.* 3:21, 2011.

Devic I, Hwang H, Edgar JS, Izutsu K, Presland R, Pan C, Goodlett DR, Wang Y, Armaly J, Tumas V, Zabetian CP, Leverenz JB, Shi M, **Zhang J**. Salivary α -synuclein and DJ-1: potential biomarkers for Parkinson's disease. *J Neuropathol Exp Neurol.* Jul;134(Pt 7):e178, 2011.

Bayer-Carter JL, Green PS, Montine TJ, Vanfossen B, Baker LD, Watson GS, Bonner LM, Callaghan M, Leverenz JB, Walter BK, Tsai E, Plymate SR, Postupna N, Wilkinson CW, **Zhang J**, Lampe J, Kahn SE, Craft S. Diet intervention and cerebrospinal fluid biomarkers in amnestic mild cognitive impairment. *Arch Neurol.* 68(6):743-52, 2011.

Shi, M, Bradner, J, Hancock, AM, Chung, KA, Quinn, JF, Peskind, ER, Galasko, D, Jankovic, J, Zabetian, CP, Kim, HM, Leverenz, JB, Montine, TJ, Ginghina, C, Kang, UJ, Cain, KC, Aasly, J, Goldstein, DS, **Zhang, J**, Cerebrospinal Fluid Biomarkers for Parkinson Disease Diagnosis and Progression. *Ann Neurol.* 2011 Mar;69(3):570-80. doi: 10.1002/ana.22311.

Wang Y, Hancock AM, Bradner J, Chung KA, Quinn JF, Peskind ER, Galasko D, Jankovic J, Zabetian CP, Kim HM, Leverenz JB, Montine TJ, Ginghina C, Edwards KL, Snapinn KW, Goldstein DS, Shi M, **Zhang J**. Complement 3 and factor H in human cerebrospinal fluid in Parkinson's disease, Alzheimer's disease, and multiple-system atrophy. *Am J Pathol.* 178(4):1509-16, 2011.

Mata IF, Shi M, Agarwal P, Chung KA, Edwards KL, Factor SA, Galasko DR, Ginghina C, Griffith A, Higgins DS, Kay DM, Kim H, Leverenz JB, Quinn JF, Roberts JW, Samii A, Snapinn KW, Tsuang DW, Yearout D, **Zhang J**, Payami H, Zabetian CP, A SNCA Variant Associated with Parkinson's Disease and Plasma α -Synuclein Level. *Arch Neurol.* 67:1350-6, 2010.

Leverenz JB, Stennis Watson G, Shofer J, Zabetian CP, **Zhang J**, Montine TJ. Cerebrospinal fluid biomarkers and cognitive performance in non-demented patients with Parkinson's disease. *Parkinsonism Relat Disord.* 2010 Oct 31. (Epub ahead of print).

Montine TJ, Shi M, Quinn JF, Peskind ER, Craft S, Ginghina C, Chung KA, Kim H, Galasko DR, Jankovic J, Zabetian CP, Leverenz JB, **Zhang J**. CSF A β 42 and tau in Parkinson's disease with cognitive impairment. *Mov Disord.* 2010 Nov 15;25(15):2682-5.

Shi M, Zabetian CP, Hancock AM, Ginghina C, Hong Z, Yearout D, Chung KA, Quinn JF, Peskind ER, Galasko D, Jankovic J, Leverenz JB, **Zhang J**. Significance and confounders of peripheral DJ-1 and alpha-synuclein in Parkinson's disease. *Neurosci Lett.* 480:78-82, 2010.

Liu J, Shi M, Hong Z, Zhang J, Bradner J, Quinn T, Beyer RP, Mcgeer PL, Chen S, **Zhang J**. Identification of ciliary neurotrophic factor receptor alpha as a mediator of

neurotoxicity induced by alpha-synuclein. *Proteomics.* 10(11):2138-50, 2010. doi:10.1002/pmic.200900745

Shi M, Huber BR, Zhang J. Biomarkers for cognitive impairment in Parkinson disease. *Brain Pathol.* 2010 May;20(3):660-71.

Rostomily RC, Born DE, Beyer RP, Jin J, Alvord EC Jr, Mikheev AM, Matthews RT, Pan C, Khorasani L, Sonnen JA, Montine TJ, Shi M, **Zhang J.** Quantitative proteomic analysis of oligodendrogiomas with and without 1p/19q deletion. *J Proteome Res.* 7;9(5):2610-8, 2010.

Caudle WM, Bammler TK, Lin Y, Pan S, **Zhang J.** Using 'omics' to define pathogenesis and biomarkers of Parkinson's disease. *Expert Rev Neurother.* 10(6):925-42, 2010

Hong Z, Shi M, Chung KA, Quinn JF, Peskind ER, Galasko D, Jankovic J, Zabetian CP, Leverenz JB, Baird G, Montine TJ, Hancock AM, Hwang H, Pan C, Bradner J, Kang UJ, Jensen PH, **Zhang J.** DJ-1 and synuclein as biomarkers of Parkinson's disease, *Brain,* 133:713-26, 2010.

Oh JH, Pan S, **Zhang J.** Gao J, MSQ: A tool for quantification of proteomics data generated by LC-MALDI TOF/TOF based targeted quantitative proteomics platform. *Rapid Comm Mass Spec,* 24(4):403-8, 2010.

Hwang H, Zhang JP, Chung KA, Leverenz JB, Zabetian CP, Peskind ER, Jankovic J, Su Z, Hancock AM, Pan C, Montine TJ, Pan S, Nutt J, Albin R, Gearing M, Beyer RP, Shi M, and Zhang J. Glycoproteomics in Neurodegenerative Diseases. *Mass Spec Reviews,* 29(1):79-125, 2010.

Caudle WM, **Zhang J.** Glutamate, excitotoxicity, and programmed cell death in Parkinson disease. *Exp Neurol.* 220:230-3, 2009.

Shi M, Bradner J, Bammler TK, Eaton DL, Zhang J, Ye Z, Wilson AM, Montine TJ, Pan C, **Zhang J** Identification of synaptosomal glutathione S-transferase Pi as a key protein in Parkinson disease progression, *American J. Path,* 175(1):54-65, 2009

Leverenz JB, Quinn JF, Zabetian C, **Zhang J.** Montine KS, Montine TJ. Cognitive impairment and dementia in patients with Parkinson disease. *Curr Top Med Chem.* 9:903-12, 2009.

Caudle WM, Kitsou E, Li J, Bradner J, **Zhang J** (2009). A role for a novel protein, nucleolin, in Parkinson's disease, *Neuroscience Letts Jul 31;459(1):11-5.*

Liu J, Zhang JP, Shi M, Quinn T, Bradner J, Beyer R, Chen S, Zhang J (2009). Rab11a and HSP90 regulate recycling of extracellular alpha-synuclein. *J Neurosci.* 4;29(5):1480-5.

Pan S, Aebersold R, Chen R, Rush J, Goodlett DR, McIntosh MW, **Zhang J**, Brentnall TA (2009), Mass spectrometry based targeted protein quantification: methods and applications, *J. Proteome Res.* 6(8):787-797

Shi M, Caudle WM and **Zhang J** (2008). Biomarker Discovery in Neurodegenerative Diseases: A Proteomic Approach, *Neurobiol Dis.* 2008 Sep 26 online

Hu X, Zhang D, Pang H, Caudle WM, Li Y, Gao H, Liu Y, Qian L, Wilson B, Di Monte DA, Ali SF, **Zhang J**, Block ML, Hong JS (2008). Macrophage Antigen Complex-1 Mediates Reactive Microgliosis and Progressive Dopaminergic Neurodegeneration in the MPTP Model of Parkinson's Disease, *J Immunol.* 181(10):7194-204.

Kitsou E, Pan S, Zhang JP, Dickson DW, Albin R, Gearing M, Kashima DT, Wang Y, Beyer DP, Zhou Y, Pan C, Caudle WM, **Zhang J** (2008), Identification of proteins in human substantia nigra, *Proteomics, Clin Application*, 2 (5):776-782.

Liu J, Hong Z, Ding JQ, Liu JR, **Zhang J**, Chen SD (2008), Predominant release of lysosomal enzymes by newborn rat microglia after LPS treatment revealed by proteomic studies. *J Proteome Res.* 7(5):2033-49

Caudle WM, Pan S, Shi M, Quinn T, Hoekstra J, Beyer RP, Montine TJ, **Zhang J**. Proteomic identification of proteins in the human brain: Towards a more comprehensive understanding of neurodegenerative disease (2008), *Proteomics - Clin Application* 2(10-11): 1484-1497

Zhang J, Keene CD, Pan C, Montine KS, Montine TJ. Proteomics of human neurodegenerative diseases (2008). *J Neuropathol Exp Neurol.* 67(10):923-32

Klegeris A, Li J, Bammler TK, Jin J, Zhu D, Kashima DT, Pan S, Hashioka S, Maguire J, McGeer PL, **Zhang J** (2008), Prolyl endopeptidase is revealed following SILAC analysis to be a novel mediator of human microglial and THP-1 cell neurotoxicity. *Glia.* 56(6):675-85

Shi M, Jin J, Wang Y, Beyer RP, Kitsou E, Albin RL, Gearing M, Pan C, **Zhang J**, (2008) Mortalin: A Protein Associated With Progression of Parkinson Disease? 1: *J Neuropathol Exp Neurol.* 67(2):117-124

Zhang J, Sokal I, Peskind E, Quinn J, Jankovic J, Kenney C, Chung K, Millard S, Nutt J, Montine TJ (2008), CSF multianalyte profile distinguishes Alzheimer's and Parkinson's diseases, *Am J Clin Path*, 129(4):526-9.

Pan S, Rush J, Peskind ER, Galasko D, Chung K, Quinn J, Jankovic J, Leverenz JB, Zabetian C, Pan C, Wang Y, Oh JH, Gao J, Zhang J, Montine T, **Zhang J** (2008). Application of Targeted Quantitative Proteomics Analysis in Human Cerebrospinal Fluid Using a Liquid Chromatography Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Tandem Mass Spectrometer (LC MALDI TOF/TOF) Platform. *J Proteome Res.* 7(2):720-30.

- Pan S, Shi M, Jin J, Albin RL, Lieberman A, Gearing M, Lin B, Pan C, Yan X, Kashima DT, **Zhang J** (2008), Proteomics identification of proteins in human cortex using multidimensional separations and MALDI tandem mass spectrometer. *Mol Cell Proteomics*. 6(10):1818-23.
- Liu, J; Zhou Y, Liu J, Fong H, Murray TM, and, **Zhang J** (2007), Proteins involved in phagocytosis of aggregated α -synuclein. *J Proteome Res*. 6(9):3614-27.
- Yang W, Woltjer RL, Sokal I, Pan C, Wang Y, Brodey M, Peskind ER, Leverenz JB, **Zhang J**, Perl DP, Galasko DR, Montine TJ (2007). Quantitative Proteomics Identifies Surfactant-Resistant alpha-Synuclein in Cerebral Cortex of Parkinsonism-Dementia Complex of Guam but Not Alzheimer's Disease or Progressive Supranuclear Palsy. *Am J Pathol*. 171(3):993-1002.
- Jin J, Davis J, Zhu D, Kashima DT, Leroueil M, Pan, C, Montine KS, and **Zhang J** (2007) Identification of novel proteins affected by rotenone in mitochondria of dopaminergic cells, *BMC Neurology*, 8(1):6
- Li G, Sokal I, Quinn JF, Leverenz JB, Brodey M, Schellenberg GD, Kaye JA, Raskind MA, **Zhang J**, Peskind ER, and Montine TJ (2007). CSF tau/Abeta42 ratio for increased risk of mild cognitive impairment: a follow-up study. *Neurology*. 2007 69(7):631-9
- Sonnen JA, Keene CD, Montine KS, Li G, Peskind ER, **Zhang J**, Montine TJ (2007). Biomarkers for Alzheimer's disease, *Expert Rev Neurother*. 7(8):1021-8.
- Chen L, Davis J, Jin J, Zhou Y, Wang Y, Liu J, Lockhart P, and **Zhang J** (2007), Oligomeric α -synuclein inhibits tubulin polymerization, *Biochem. Biophys. Res. Comm*, 356(3):548-53.
- Zhang W, Dallas S, Guo JP, Pang H, Wilson B, Miller DS, Jia J, Chen B, Zhang W, McGeer PL, Hong JS, and **Zhang J** (2007), Microglial Mac-1 and PHOX are essential to the enhanced dopaminergic neurodegeneration elicited by A30P and A53T mutant α -synuclein, *Glia*, 55:1178-88
- Jin J, Li GJ, Davis J, Zhu D, Wang C, Pan C, and **Zhang J** (2007), Identification of novel proteins interacting with both α -synuclein and DJ-1, *Mol Cell Proteomics*. 6:845-59, 2007.
- Jin J, Shie FS, Liu J, Wang Y, Davis J, Schantz AM, Montine KS, Montine TJ, Zhang J. Prostaglandin E2 receptor subtype 2 (EP2) regulates microglial activation and associated neurotoxicity induced by aggregated alpha-synuclein, *J Neuroinflammation*. 4;4:2, 2007.
- Pan S, Zhu D, Quinn JF, Peskind ER, Montine TJ, Lin B, Goodlett DR, Taylor G, Eng J, **Zhang J**. (2007), A combined dataset of human cerebrospinal fluid proteins identified by multi-dimensional chromatography and tandem mass spectroscopy, *Proteomics*, 7(3):469-73.
- Leverenz, JB, Umar I, Wang Q, Montine TJ, Jin J, Pan C, Shin J, Zhu D, and **Zhang J** (2007), Proteomic Identification of Novel Proteins in Cortical Lewy Bodies, *Brain Pathology*, 17(2):139-145.

Zhang J and Montine TJ. Proteomic discovery of CSF biomarkers for Alzheimer's disease. *Ann Neurol.* 61(5):497, 2007.

Pan S, Wang W, Quinn JF, Peskind ER, Waichunas D, Wimberger JT, Jin J, Li DJ, Zhu D, Pan C, and **Zhang J** (2006), Identification of glycoproteins in human cerebrospinal fluid with a complementary proteomic approach, *Journal of Proteomic Research*, 5:2769-2779

Zhang H, Loriaux P, Eng J, Campbell D, Keller A, Moss P, Bonneau R, Zhang N, Zhou Y, Wollscheid B, Cooke K, Yi EC, Lee H, Peskind ER, **Zhang J**, Smith RD, Aebersold R (2006), UniPep, a database for human N-linked glycosites: A Resource for Biomarker Discovery, *Genome Biology*, August online

Abdi F, Quinn JF, Jankovic J, McIntosh M, Leverenz JB, Peskind E, Nutt J, Chung K, Zabetian C, Samii A, Lin M, Hattan S, Pan C, Wang Y, Jin J, Zhu D, Li J, Liu Y, Waichunas D, Montine TJ, **Zhang J** (2006), Detection of biomarkers with a multiplex quantitative proteomic platform in cerebrospinal fluid of patients with neurodegenerative disorders, *Journal of Alzheimer's Disease* 9:293-348.

Jin J, Hulette C, Wang Y, Zhang T, Pan C, Wadhwa R, and and, **Zhang J** (2006), Proteomic Identification of a Stress Protein, Mortalin/mthsp70/GRP75, *Mol Cell Proteomics*, 5(7):1193-204. Epub 2006 Mar 24. Mar 24

McLaughlin P, Zhou Y, Ma T, Liu J, Kovacs M, and, **Zhang J** (2006), Proteomic analysis of microglial contribution to mouse strain-dependent dopaminergic neurotoxicity, *Glia* 53:567-82

Xu J, Chen J, Peskind, ER, Jin J, Eng J, Pan P, Montine TJ, Goodlett DR, **Zhang J** (2006), Characterization of proteome of human cerebral spinal fluid. *Int. Rev Neurobiol*, 73:29-98

Thakker MM, **Zhang J**, Sires BS (2005). Chronic Inflammation from polycarbonate motility peg inhibits osteogenesis in a human hydroxyapatite orbital implant. *Ophthal Plast Reconstr Surg.* 21(5):399-401

Xiong X, Shie FS, **Zhang J**, Lee CP, and Ho YS (2005). Prevention of mitochondrial dysfunction in post-traumatic mouse brain by superoxide dismutase. *J. Neurochem.* 95(3):732-44.

Woltjer RL, Cimino PJ, Pan C, **Zhang J**, Montine KS, Montine TJ (2005). Proteomic determination of widespread detergent-insolubility including Abeta but not tau early in the pathogenesis of Alzheimer's disease. *FASEB J.* 19(13):1923-5.

Zhou Y, Wang Y, Kovacs M, Jin J, and **Zhang, J**, Microglial activation induced by neurodegeneration – A proteomic analysis, *Molecular Cellular Proteomics*, 2005 Oct;4(10):1471-9.

Zhang J, Goodlett DR, Peskind ER, Quinn, JF, Zhou, Y, Pan, P, Yi, E, Eng, J, Aebersold, R. and Montine, TJ (2005), Quantitative proteomics of cerebrospinal fluid from Alzheimer disease and controls using isotope-coded affinity tags. *Journal of Alzheimer's Disease*, 7:125-33.

Yenerel, NM, Boada, R, Clifton, B, **Zhang, J**, and Saperstein, DA (2005), Ganciclovir Implant with Cyst-like Abnormality Arch Ophthal, 123(2):282-3

Wang Q, Woltjer RL, Cimino PJ, Pan C, Montine KS, **Zhang J**, Montine TJ (2005). Proteomic analysis of neurofibrillary tangles in Alzheimer Disease identifies GAPDH as a detergent-insoluble paired helical filament tau-binding protein. *FASEB J*. 19:869-71.

Jin J, Meredith G, Chen L, Zhou Y, Xu J, Xie FX, Lockhart P, and **Zhang J** (2005), Quantitative proteomic analysis of mitochondrial proteins: relevance to Lewy body formation and Parkinson's disease. *Molecular Brain Res*, 24;134(1):119-38.

Zhang W, Wang T, Pei Z, Meng Y, Wu XF, Belinda W, Zhang W, Hong JS and **Zhang J** (2005), Aggregated α -synuclein activates microglia: a process leading to disease progression in Parkinson's disease. *FASEB J* 19:532-541.

Zaja-Milatovic S, Schantz, A, **Zhang J**, Montine KS, Samii A, Deutch A, and Montine, TJ (2005), Dendritic Degeneration in Neostriatal Medium Spiny Neurons in Parkinson Disease. *Neurol* 64:545-7.

Zhang J, Goodlett, DR, Peskind, ER, Quinn, JF, Zhou, Y, Pan, P, Yi, E, Eng, J, Aebersold, R. and Montine, TJ (2005), Quantitative proteomic analysis of age-related changes in human cerebrospinal fluid. *Neurobiol Aging*, 26: 207-227.

Ye X., Shie F.S., **Zhang J**, and Ho, YS (2004) The protective role of cellular glutathione peroxidase against mitochondrial dysfunction in head trauma, *J Stroke and Cereb Dis*, 13:129-137.

Zhou Y, Gu G, Goodlett, DR, Yi, EC, Eng J, Pan P, Montine, KS, Montine, TJ, Aebersold, RH, and **Zhang J** (2004), Analysis of α -Synuclein Associated Proteins by Quantitative Proteomics. *J. Biol. Chem*, 279:39155-39164.

Zhou Y, Shie FS, Piccardo P, Montine TJ and **Zhang J** (2004), Proteasomal inhibition induced by manganese ethylene-bis-dithiocarbamate: relevance to Parkinson's disease. *Neuroscience*, 128:281-291.

Zhang J, and Goodlett, DR (2004). Proteomic approach to studying Parkinson's disease. *Mol Neurol*, 29:271-88.

Fessel JP, Hulette C, Powell S, Roberts LJ, **Zhang J** (2003). Isofurans, but not F₂-isoprostanes, are increased in the substantia nigra of patients with Parkinson's disease and with dementia with Lewy body disease. *J Neurochem*. 85:645-50.

Guangyu G, Franklin, J, Levy, S, Wallace, DC, and **Zhang, J** (2003) Profiling genes related to mitochondrial function in mice treated with N-methyl-4-phenyl-1,2,3,6-tetrahydropyridine. *Biochem. Biophys. Res. Com.* 308:197-205

Lekse, J.M., **J. Zhang**, and L.A. Mawn (2003) Metastatic gastroesophageal junction adenocarcinoma to the extraocular muscles. *Ophthalmology* 110:318-21

Zhang, J., V Fitsanakis, G Gu, DJ Jing, M Ao, V Amarnath, and TJ Montine (2003) Manganese ethylene-bis-dithiocarbamate and selective dopaminergic neurodegeneration in rat: A link through mitochondrial dysfunction. *J. Neurochem.* 84:1-11

Fitsanakis, VA, Amarnath V, Moore JT, **Zhang J**, and Montine TJ (2002). Catalysis of catechol oxidation by metal-dithiocarbamate complexes in pesticides. *Free Rad Biol Med* 33(12):1714-23.

Sidell, K.R. **J Zhang**, and TJ Montine (2002). Dopamine thioethers: formation in brain and neurotoxicity. *Neurotoxicity Res.* 4: 663-669

Zhang, J (2002) Diagnosis of parkinsonism at autopsy *Ann. Contem. Diag. Path.* 5:45-50

Gu G., F.R. Patricio, G.T. Golden, R. Woltjer, C. Hulette, T.J. Montine, and **J. Zhang** (2002) Mitochondrial DNA Deletions/Rearrangements in Parkinson's Disease and Related Neurodegenerative Disorders *J. Neuropathol. Exp. Neurol* 6:634-9

Castellani, R.J., G. Perry, S.L. Siedlak, A. Nunomura, S. Shimohama, **J. Zhang**, T. Montine, L.M. Sayre, M.A. Smith (2002) Hydroxynonenal adducts indicate a role for lipid peroxidation in neocortical and brainstem Lewy bodies in humans. *Neurosci Lett.* 319(1):25-8.

Zhang J., T.J. Montine, M.A. Smith, S.L. Siedlak, D. Robertson, and G. Perry (2002) The mitochondrial common deletion in Parkinson's disease and related movement disorders. *Parkinsonism and Related Dis* 8:165-170.

Boyd, A. and **J. Zhang** (2001) Hemangioblastoma arising from the skin. *Am J Dermatopathol* 23: 482-4.

Tsai, J.S. J.A. Sivak-Callcott, B. G. Haik, **J. Zhang**, I.W. McLean (2001) Latanoprost-induced iris heterochromia and open-angle glaucoma: a clinicopathologic report. *J. Glaucoma* 10:411-3.

Shappell, S.B., D.S. Keeney, **J. Zhang**, R. Page, S.J. Olson, and A.R. Brash (2001) 15-Lipoxygenase-2 expression in benign and neoplastic sebaceous glands and other cutaneous adnexa. *J Invest Dermatol* 2001 Jul;117(1):36-43.

Amarnath, V., K. Amarnath, D.G. Graham, Q. Qi, H. Valentine, **J. Zhang**, and W.M. Valentine (2001) Identification of a new urinary metabolite of carbon disulfide using an improved method for determination of 2-thioxothiazolidine-4-carboxylic acid. *Chem. Res. Toxicol* 14:1277-1283.

Montine TJ, Amarnath V, Picklo MJ, Sidell KR, **Zhang J**, Graham DG (2000). Dopamine mercapturate can augment dopaminergic neurodegeneration. *Drug Metab Rev* 32(3-4):363-76.

Zhang J., V. Kravtsov, V. Amarnath, M.J. Picklo, D.G. Graham, and T.J. Montine (2000). Enhancement of dopaminergic neurotoxicity by the mercapturate of dopamine: Relevance to Parkinson's disease. *J. Neurochem.* 74:970-978.

- Zhang J.**, D.G. Graham, T.J. Montine, and Y.S. Ho (2000). Enhanced N-methyl-1,2,3,6-tetrahydropyridine toxicity in mice deficient in Cu-Zn superoxide dismutase or glutathione peroxidase. *J. Neuropathol. Exp. Neurol.* 59:58-66.
- Zhang J.**, G. Perry, M.A. Smith, D. Robertson, S.J. Olson, D.G. Graham, and T.J. Montine (1999). Parkinson's disease is associated with oxidative damage to cytoplasmic DNA and RNA. *Am. J. Pathol.* 154: 1423-1430.
- Nunomura A., G. Perry, **J. Zhang**, T.J. Montine, A. Takeda, S. Chiba, and M.A. Smith (1999). RNA oxidation in Alzheimer and Parkinson disease. *J. Anti-Aging Med.* 2:227-230.
- Picklo M.J., **J. Zhang**, V.Q. Nguyen, D.G. Graham, and T.J. Montine (1999). High-pressure liquid chromatography quantification of cytochrome C using 393 nm detection. *Analytic Biochem.* 276:166-170.
- Zhang J.**, J. Price, D.G. Graham, and T.J. Montine (1998). Secondary excitotoxicity contributes to dopamine induced apoptosis in dopaminergic neuronal cultures. *Biochem. Biophys. Res. Comm.* 248:812-816.
- Piantadosi C.A., **J. Zhang**, R. Folz, E.D. Levin, and D. Schmeichel (1997) Apoptosis and delayed neuronal death after carbon monoxide poisoning in the rat. *Exp. Neurol.*. 147:103-114.
- Piantadosi C.A., **J. Zhang** and I.T. Demchenko. (1997) Production of hydroxyl radicals in the hippocampus after CO hypoxia or hypoxic hypoxia in the rat. *J. Free Radic. Biol. Med.* 22:725-732.
- Piantadosi C.A. and **J. Zhang**. (1996) Mitochondrial generation of reactive oxygen species after brain ischemia in the rat. *Stroke* 27:327-332.
- Kil H.Y., **J. Zhang** and C.A. Piantadosi (1996) Ischemic brain temperature alters hydroxyl radical production in rats during cerebral ischemia/reperfusion. *J. Cereb. Blood Flow Metab.* 16:100-106.
- Zhang J.**, A.D. Sam, B. Klitzman and C.A. Piantadosi. (1995) Inhibition of nitric oxide synthase does not decrease oxygenation in brain cortex of rats exposed to hyperbaric oxygen. *Undersea Hyper. Med.* 22:377-382.
- Zhang J.**, H. Benveniste, B.M. Klitzman and C.A. Piantadosi. (1995) Nitric oxide synthase inhibition alters extracellular glutamate concentration after global cerebral ischemia. *Stroke* 26:298-304.
- Piantadosi C.A., L. Tattro and **J. Zhang**. (1995) Hydroxyl radical production in the brain after CO hypoxia in rats. *J. Free Radic. Biol. Med.* 18:603-609.
- Zhang J.** and C.A. Piantadosi. (1994) Production of hydroxyl radicals in rat hippocampus during global brain ischemia/reperfusion. *Neurosci. Lett.* 177:127-130.
- Zhang J.**, H. Benveniste and C. A. Piantadosi. (1993) Inhibition of nitric oxide synthase increases extracellular cerebral glutamate concentration after global ischemia. *Neurosci. Lett.* 157:179-182.

Zhang J., Y.F. Su, T. D. Oury and C.A. Piantadosi. (1993) Cerebral amino acids, norepinephrine and nitric oxide metabolism in CNS oxygen toxicity. *Brain Res.* 606:56-62.

Simonson S.G., **J. Zhang**, A.T. Canada, Y.F. Su, H. Benveniste and C.A. Piantadosi. (1993) Hydrogen peroxide production by monoamine oxidase during ischemia-reperfusion in the rat brain. *J. Cereb. Blood Flow Metab.* 13:125-134.

Zhang J. and C.A. Piantadosi. (1992) Mitochondrial oxidative stress after carbon monoxide hypoxia in the rat brain. *J. Clin. Invest.* 90:1193-1199.

Ghio A.J., **J. Zhang** and C.A. Piantadosi. (1992) Generation of hydroxyl radical by crocidolite asbestos is proportional to surface $[Fe^{3+}]$. *Arch. Biochem. Biophys.* 298:646-650.

Zhang J. and C.A. Piantadosi. (1991) Prevention of H_2O_2 generation by monoamine oxidase protects against CNS O_2 toxicity. *J. Appl. Physiol.* 71:1057-1061.

Zhang J., C.E. Fife, M. S. Currie, R.E. Moon, C.A. Piantadosi and R.D. Vann. (1991) Venous gas emboli and complement activation after deep repetitive air diving. *Undersea Biomed. Res.* 18:293-302.

Zhang J. and G.T. Ni (1989). Prevention of decompression sickness with drugs. *J. Env. Med. of China* 26:354-359.

Zhang J. (1988) Metabolites of arachidonic acid and decompression sickness. *Med. Foreign Countries* 5:270-274.

Zhang J. and G. T. Ni. (1986) Changes in thromboxane A₂ and prostacyclin in rabbits suffering from decompression sickness. *Acad. 2nd Milit. Med. Univ.* 7:762-764.

Book Chapters and Reviews:

LeWitt PA, Huber BR, and **Zhang J.** An Update on CSF Biomarkers of Parkinson's Disease. In Mandel (ed.), *Neurodegenerative Diseases: Integrative PPPM Approach as the Medicine of the Future, Advances in Predictive, Preventive and Personalised Medicine 2*, DOI 10.1007/978-94-007-5866-7_8, © Springer ScienceCBusiness Media Dordrecht 2013

Shi M, Hwang H, and **Zhang J.**: Quantitative characterization of glycoproteins in neurodegenerative disorders using iTRAQ "Mass Spectrometry of Glycoproteins: Methods and Protocols" for the Methods in Molecular Biology series (Methods in Molecular Biology) by Jennifer J. Kohler and Steven M. Patrie, 2013

Jin JH, Cook TJ, Hoekstra J, and **Zhang J.** Mortalin in Neurological Diseases, in **Mortalin Biology: Life, Stress and Death** Sunil C. Kaul (Editor), Renu Wadhwa (Editor). Springer; 2012 edition

Hwang H, Quinn T, and **Zhang J.** Neuroproteomics: Identification of glycoproteins in human cerebrospinal fluid - In **Neuroproteomics: Methods and Protocols (Methods in Molecular Biology)** Andrew K. Ottens (Editor), Kevin K.W. Wang (Editor) Humana Press, 2009.

Zhang J., Proteomics of human cerebrospinal fluid: The good, the bad and the ugly. *Proteomics – Clinical Application*, Published Online: 13 Jul 2007.

Jin J and **Zhang J.** Protein-protein interaction in Parkinson's disease: A proteomic approach, In *Proteomics of Neurodegenerative Disease*, Edited by TJ Montine, 2006, pp 131-148

Montine TJ, Woltjer RL, Pan C, Montine KS, and **Zhang J.** Liquid chromatography with tandem mass spectrometry-based proteomic discovery in aging and Alzheimer's disease, *NeuroRx®*, 3(3):336-43, 2006

Zhang J., Goodlett DR, Montine TJ, Proteomic biomarker discovery in cerebrospinal fluid for neurodegenerative diseases, *Journal of Alzheimer's Disease*, 8: 377-386, 2006.

Montine T.J., V. Amarnath, J. Zhang, and G.G. Graham (2007). Role of catechol thioethers in neurotoxicity. In press

Graham, D.G., M.J. Picklo, V. Amarnath, J. **Zhang**, and T.J. Montine (2007). Role of quinones in catechol neurotoxicity. In press.

Zhang J and Montine TJ Oxidative Processes. In **Primer on the Autonomic Nervous System** 2nd Edition by David W. Robertson, Phillip A. Low and Ronald J. Polinsky, Formats Ed C.R. Creveling, 1996.

Montine, KS, Quinn, JF, **Zhang**, J, Fessel, JP, Roberts, LJ, II, Morrow, JD, and Montine, TJ (2004). Isoprostanes and related products of lipid peroxidation in neurodegenerative diseases *Chemistry and Physics of Lipids*, 128: 117-124.

Zhang J (2003). Book Review: Methods in Molecular Biology, Volume 232, Protein Misfolding and Diseases: Principles and Protocols. *J. Alzheimer's Dis.* 4:1

Zhang J., T.D. Oury, L.G. Tatro and C.A. Piantadosi. (1994) Cerebral amino acids and hyperbaric oxygen toxicity. In: Bennett P.B. and R.E. Marquis ed. *Basic and Applied High Pressure Biology*, University of Rochester Press, New York, pp 431-436.

**UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA**

IN RE: NATIONAL FOOTBALL LEAGUE
PLAYERS' CONCUSSION INJURY
LITIGATION

No. 2:12-md-02323-AB
MDL No. 2323

Kevin Turner and Shawn Wooden,
*on behalf of themselves and
others similarly situated,*

Civil Action No. 2:14-cv-00029-AB

Plaintiffs,

v.

National Football League and
NFL Properties, LLC,
successor-in-interest to
NFL Properties, Inc.,

Defendants.

THIS DOCUMENT RELATES TO:
ALL ACTIONS

DECLARATION OF Martha E. Shenton, Ph.D.

I, Martha Shenton affirm under penalty of perjury the truth of the following facts:

1. I am Professor in the Department of Psychiatry and Radiology, Brigham and Women's Hospital and Harvard Medical School. My *curriculum vitae* is attached as Exhibit A.
2. I have been asked to submit this declaration in support of the objection to the proposed class action settlement in the above captioned case filed by the MoloLamken LLP law firm. I am not being compensated for my work in doing so.
3. Chronic traumatic encephalopathy (or CTE) is a unique neurodegenerative disease; it is not the same as ALS, Alzheimer's disease, or Parkinson's disease.
4. Repetitive brain trauma is a necessary condition for developing CTE.

5. ALS, Alzheimer's disease, and Parkinson's disease are found in the general population of individuals who have not suffered repetitive brain trauma. Suicidality does not present as a symptom of these diseases.

6. Mood and behavioral impairments such as depression, suicidality, hopelessness, impulsivity, explosiveness, rage, and aggression, although present in the general population, appear more frequently in individuals suffering from CTE than in the general population.

7. The mood and behavioral impairments associated with CTE can present prior to the onset of CTE-related dementia and can be the cause of significant disability and distress for the patient.

8. Based on my experience and knowledge of the clinical and scientific literature, I believe that a reliable, valid, and clinically accepted diagnosis of CTE, based, in part, on objective biomarkers, will likely be possible in the next decade, if not sooner, and long before the 65-year term of the proposed NFL Concussion Litigation Settlement expires.

9. I am not aware of the use of the diagnostic or classification categories of "Neurocognitive Impairment Level 1.0," "Neurocognitive Impairment Level 1.5," or "Neurocognitive Impairment Level 2.0" anywhere in the medical or scientific community.

Pursuant to 28 U.S.C. § 1746, I state under penalty of perjury that the foregoing is true and correct.



Dated: November 27, 2014

Martha E. Shenton, Ph.D.

Exhibit A

CURRICULUM VITAE

Prepared: 11/21/2014

PART I:

GENERAL INFORMATION

Name: Martha Elizabeth Shenton

Office Address: Psychiatry Neuroimaging Laboratory
 Department of Psychiatry, Brigham and Women's Hospital
 1249 Boylston Street – 3rd Floor, Boston, MA 02215
 Telephone: (617) 525-6117
 Fax: (617) 525-6150
 E-mail: Shenton@bwh.harvard.edu
 Website: <http://pnl.bwh.harvard.edu>
 Facebook: <https://www.facebook.com/PNL.bwh.harvard.edu?fref=ts>

Home Address: 35 South Street, Needham, MA 02492

Place of Birth: Concord, NH

Education:

1973	A.B. Wellesley College
1976	M.S. Tufts University
1981	M.A. Harvard University
1984	Ph.D. Harvard University

Postdoctoral Training:

Fellowships:

1984-1986	National Institute of Mental Health (NIMH) –National Research Service Award (T32) Postdoctoral Clinical Research Training Fellow in Biological Psychiatry in the Laboratory of Neurophysiology and in the Cognitive Neuroscience Laboratory, Harvard Medical School (HMS), Department of Psychiatry at the Massachusetts Mental Health Center (MMHC), Boston, MA.
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Licensure and Certification:

1987-	Licensed Psychologist, Massachusetts Board of Registration of Psychologists (#4297)
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Academic Appointments:

1984-1986	Research Fellow in Biological Psychiatry, in the Laboratory of Neurophysiology, Department of Psychiatry, HMS, MMHC, Boston, MA
1986-1989	Instructor in Psychology, Department of Psychiatry, HMS, MMHC, Boston, MA
1989-1993	Assistant Professor of Psychology, Department of Psychiatry, HMS, MMHC, Boston, MA
1993-2000	Associate Professor of Psychology, Consolidated Department of Psychiatry, HMS, Boston, MA
2000-2005	Professor of Psychology, Department of Psychiatry, VA Brockton, HMS, Brockton, MA
2003-	Professor of Radiology, Department of Radiology, Brigham and Women's Hospital, HMS, Boston, MA
2005-	Professor of Psychology, Department of Psychiatry, Brigham and Women's Hospital, HMS, Boston, MA

Hospital or Affiliated Institution Appointments:

1979-1984	Research Fellow in Psychopathology, Psychology Laboratory, Mailman Research Center, McLean Hospital, HMS, Belmont, MA
1984-1986	Research Fellow in Biological Psychiatry, in the Laboratory of Neurophysiology, HMS, Department of Psychiatry, MMHC, Boston, MA
1985-1995	Research Health Scientist (WOC), Department of Psychiatry at the Brockton VA Medical Center, HMS, Brockton, MA
1988-2007	Research Associate, Department of Radiology, Surgical Planning Laboratory, Brigham and Women's Hospital, HMS, Boston, MA
1989-2000	Research Associate in Psychology, Laboratories of Psychiatric Research, McLean Hospital, HMS, Department of Psychiatry, Belmont, MA
1995-1995	Health Statistician, Department of Psychiatry at the Brockton VA Medical Center, HMS, Brockton, MA
1995-1998	Research Health Scientist (WOC), Department of Psychiatry at the Brockton VA Medical Center, HMS, Brockton, MA
1998-2005	Lead Psychologist, Department of Psychiatry at the VA Boston Healthcare System, Brockton Campus, Brockton, MA
2005-	Health Scientist, VA Boston Healthcare System, Brockton Campus, Brockton, MA
2005-2007	Research Associate, Department of Psychiatry, Brigham and Women's Hospital, HMS, Boston, MA
2007-	Senior Scientist, Brigham and Women's Hospital, HMS
2008-	Senior Scientist, Judge Baker Children's Center, HMS

Other Professional Positions and Major Visiting Appointments:

1984-1985	Visiting Lecturer in Psychology, Brandeis University, Waltham, MA
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Hospital and Health Care Organization Service and Other Major Administrative Responsibilities:

1986-2005	Clinical Research Advisor for Post-Doctoral Research Fellows in the Department of Psychiatry, VA Boston Healthcare System, HMS, Brockton, MA
1986-2005	Director, Clinical Evaluation Section, Neuroscience Laboratory, HMS, Department of Psychiatry at the Brockton VA Medical Center, Brockton, MA
1987-2005	Director, MRI Section, Laboratory of Neuroscience, HMS, Department of Psychiatry, VA Medical Center, Brockton, MA
1990-2005	Clinical Research Advisor for Visiting Scholars in the Department of Psychiatry, VA Boston Healthcare System, HMS, Brockton, MA
1992-2005	Co-Director, Cognitive Neuroscience Laboratory, Department of Psychiatry, Hospital, HMS, Belmont, MA
1993-1994	Acting Co-Director, Biological Psychiatry, Clinical Research Training Program, Department of Psychiatry, HMS, Boston, MA
1993-1994	Coordinator, Neuroscience Seminar Series, Residency Training Program in Psychiatry, Veterans Affairs Medical Center, HMS, Brockton, MA
1993-1996	Coordinator, Biological Psychiatry, Clinical Research Training Program, Department of Psychiatry, HMS, Boston, MA
1993-	Preceptor, Biological Psychiatry, Clinical Research Training Program, Department of Psychiatry, HMS, Boston, MA
1995-2000	Scientific Co-Director, VA Center for Basic and Clinical Neuroscience Studies of Schizophrenia, VAMC-Brockton, Department of Psychiatry, HMS, Brockton, MA
1995-	Director, Psychiatry and Behavioral Sciences Imaging, Surgical Planning Laboratory, MRI Division, Department of Radiology, Brigham & Women's Hospital, HMS, Boston, MA

1995-	Director, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry at the Brockton VA Medical Center, and the Boston VA Healthcare System, Brockton Division, HMS, Brockton, MA
1996-2008	Associate Director, Clinical Research Training Program, Department of Psychiatry, HMS, Boston, MA
2005-	Founding Director, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, HMS, Brockton, MA
2007-2012	Director, Resident Pathways Training in Research Program, Harvard South Shore Psychiatry Residency Training Program, HMS, VA Boston Healthcare System, Brockton, MA
2008-	Co-Director, Clinical Research Training Program, Department of Psychiatry, HMS, Boston, MA

Major Committee Assignments:

International, National and Regional

1994-1996	NIMH Special Review Committee (SRC), Ad Hoc Reviewer
1994-1996	NIMH Behavioral Science Track Award for Rapid Transition (B/START), Ad Hoc Reviewer
1996-1998	NIH Clinical Neuroscience & Biological Psychopathology Review Committee, Member
1997	NIH Special Emphasis Panel Review, Member
1998-2000	NIH Brain Disorders & Clinical Neuroscience Study Section (BDCN-6), Member
1998	Local Committee, XII th Event-Related Potentials International Congress (EPIC XII), Member
1998	NIH Special Emphasis Panel Review, Member
1999-2002	Lilly Fellowship Award Committee, <i>Society of Biological Psychiatry</i> , Member
2000	NIMH Special Emphasis Panel Review, Chair of Teleconferencing IRG
2000-2006	Reviewer, The Wellcome Trust
2001	Lilly Fellowship Award Committee, <i>Society of Biological Psychiatry</i> , Co-Chair
2001-2004	Reviewer, March of Dimes, Birth Defects Foundation
2001-2003	NIH Brain Disorders & Clinical Neuroscience Study Section (BDCN-6), Member
2002	Lilly Fellowship Award Committee, <i>Society of Biological Psychiatry</i> , Chair
2002	National Institute of Mental Health Workshop Planning Meeting: First Episode Schizophrenia, Member
2002	NIMH Special Emphasis Panel Review, BDCN-2, Teleconferencing IRG, Member
2002	Department of Veterans Affairs, Washington, DC, Neuroimaging Study Section, Member
2002	Department of Veterans Affairs, Washington, DC, REAP Midterm Review Committee, Member
2002	NIMH Board of Scientific Counselors Review, Ad Hoc Reviewer
2003-2005	Education and Training Committee, <i>American College of Neuropsychopharmacology</i> , Member
2003-2006	NIH Neural Basis of Psychopathology, Addictions and Sleep Disorders Study Section (NPAS), Member
2004-2006	Ethics Committee, <i>American College of Neuropsychopharmacology</i> , Member
2004	Reviewer, Sheffield Hospitals Charitable Trust for Medical Research, The University of Sheffield
2005-	International Advisory Board Member, <i>Schizophrenia International Research Society</i>
2006-2006	Ad Hoc Reviewer for NIH Study Section (ZRG1 BDCN-A 90 S), Molecular Mechanisms, Genetics, and Animal Models of Neuropsychiatric Disorders
2006-2006	Ad Hoc Reviewer for NIH Study Section Neural Basis of Psychopathology, Addictions and Sleep Disorders (NPAS)
2006	Program Committee, <i>International Congress on Schizophrenia Research</i> , Member
2007	Reviewer for the Neuroscience and Mental Health Board, <i>Medical Research Council</i> , London, UK

2007 Scientific Advisory Board for *Human Brain Mapping*, Member
 2007 Scientific Review NIH (Z MH 1 ERB-S), Silvio Conti Centers, Member
 2007 VA Biomedical Laboratory Research and Development and Clinical Science and Research and Development (BLRD/CSRD), Career Development Review Panel, Member
 2007 Scientific Review NIH (MH BDCN-Member Conflict Committee), Member
 2007 Work Group of Scientists to Review Needs for a Special Emphasis Panel on Neurotechnology, National Institutes of Health, Center for Scientific Review, Member
 2007 Scientific Review NIH (Z MH1 ERB-C(01), CIDAR Review, Member
 2007-2008 University of Minho, Braga, Portugal, Post-Doctoral Fellowship Committee, Member, Government of Portugal
 2008 Reviewer for the Research Competitiveness Program for the *American Association for the Advancement of Science*
 2008 Scientific Review for NIH EUREKA (Exceptional, Unconventional Research Enabling Knowledge Acceleration) ZNS1 SRB-P(44), Member
 2008 Reviewer for the *Welcome Trust*
 2008 Ad Hoc Reviewer for ZMH1 CNF-Z01 S (Conferences to Advance Mental Health Research)
 2009-2010 Advocacy Committee, *American College of Neuropsychopharmacology*, Member
 2009-2011 Ethics Committee, *American College of Neuropsychopharmacology*, Member
 2009 *Israel Science Foundation*, Grant Reviewer
 2009 Scientific Review NIH (MH ZRG1 BDCN-T(58)R, "Challenge Grants", Member
 2009 Program Committee, *Society for International Research on Schizophrenia*, Member
 2009 Scientific Review NIH (ZMH1 ERB-C 01 S), National Research Service Award Institutional Training Grants, Member
 2010 Scientific Review NIH (ZNS1 SRB-B-21) Study Section, EUREKA (Exceptional, Unconventional Research Enabling Knowledge Acceleration) Study section, Member
 2010 NIH National Science Foundation and Graduate Research Fellowship Program (GRFP), Member
 2010 Program Committee, *Society for International Research on Schizophrenia*, Member
 2010 Reviewer for the *US-Israel Binational Science Foundation*
 2010-2012 Membership Committee, *Society for International Research on Schizophrenia*, Member
 2010-2012 Awards Committee, *Society for International Research on Schizophrenia*, Member
 2010 Scientific Review NIH T32 Institutional Research Training Grant (NIH ZMH1 ERB-S-01), Member
 2010 Reviewer for Academy for Interdivisional Innovational Research Incentive Scheme, WOTR Science for Global Development, *the Netherlands Organization for Scientific Research*
 2011 Scientific Review NIH (ZNS SRB-B) Study Section, EUREKA (Exceptional, Unconventional Research Enabling Knowledge Acceleration) Study Section, Member
 2011 *Health Research Board*, Reviewer, Dublin, Ireland
 2011 Examiner, Ph.D. dissertation, Melbourne University, Melbourne, Australia
 2011 Mentor, *International Congress of Schizophrenia Research*
 2011 Special Emphasis Panel for Conflict Members: Autism, Schizophrenia, and Addiction, NIH Study Section ZRG1 BDCN-C(02)M, Member
 2011 Scientific Review NIH T32 Institutional Research Training Grant (NIH ZMH1 ERB-S-01), Member
 2011 *Swiss National Science Foundation*, Reviewer for Fellowships
 2011- Advisory Board, Center for Research in Psychology, School of Psychology, University of Minho, Minho, Portugal, Member
 2011 *French National Research Agency*, Reviewer for grant submissions
 2011 *World Congress of Psychiatry*, Section on Neuroimaging, Member
 2012- Awards Committee, *American Neuropsychiatric Association*
 2012- Internal Advisory Council, *Schizophrenia International Research Society*
 2012 Ad-hoc Reviewer: NIMH K99/R00 Special Emphasis Panel

2012	<i>The Swiss National Science Foundation</i> , Reviewer
2012-2014	Program Committee, <i>Society for International Research in Schizophrenia</i> , Member
2013	Organizer with Dr. Brett Clements for setting up a reception for NIMH Sponsored Young Investigators for the <i>International Congress of Schizophrenia</i> , for all young investigators dating back to 1987
2013	Reviewer, grants for the <i>Israel Science Foundation</i> .
2013	Program Committee, <i>Society for International Research on Schizophrenia</i> , Member
2013	Program Committee, Young Investigator and Career Awards for the <i>American Neuropsychiatric Association</i> , Member
2013	VA Rehabilitation Research and Development Service, <i>VA Small Projects in Rehabilitation Research (SPiRE) Award</i> , Reviewer
2013	VA Rehabilitation Research and Development Service, <i>VA Small Projects in Rehabilitation Research (SPiRE) Award</i> , Reviewer
2013	NINDS Special Emphasis Panel to review cooperative agreement applications submitted in response to the RFA "International Traumatic Brain Injury Research Initiative: NIH Cooperative Program for Comparative Effectiveness of Clinical Tools and Therapies", Member
2013	National Institute of Neurological Disorders and Stroke (NINDS) Special Emphasis Panel [08 XNSI SRB-E(56)], Member
2013	Brain Trauma-Related Neurodegeneration Workshop, National Institute of Neurological Disorders and Stroke (NINDS), Invited Member
2013	Developing Standards for Diffusion Tensor Imaging (DTI) and Diffusion Spectrum Imaging (DSI) through Public-Private Partnerships", sponsored by the <i>Institute of Medicine's Forum on Neuroscience and Nervous System Disorders, Health Arm of the National Academy of Science</i> , Invited Member
2013	NIH Study Section BDCN-N(58)R Pilot Projects on Sports-Related Brain and Spinal Cord Injury, Member
2013-2020	NIH, Clinical Neuroscience and Neurodegeneration Study Section (CNN), Member
2014	Special Emphasis Panel/Scientific Review Group 05 ZDA1 ML-F, Member
2014	National Institute of Drug Abuse (NIDA), R03 1/Start 10 ZA/1 ABC, Member
2014	<i>The Swiss National Science Foundation</i> , Reviewer
2014-	Chronic Effects of Neurotrauma Consortium (CENC): Neuroimaging Leadership Work Group Meeting, Member
2014	<i>The South African Medical Research Council</i> , Reviewer
2014	<i>Presiding Committee of the Austrian Academy of Sciences</i> , Reviewer
2014	Mentor Program, Mentor, <i>American College of Neuropsychopharmacology</i>

Harvard University

1981-1983	Member of the Board of Tutors and Advisors, Department of Psychology (Faculty of Arts and Sciences), Harvard University, Cambridge, MA
1981-1983	Resident Tutor, Dudley House, Harvard College, Cambridge, MA
1981-1983	Premedical Advisor for Psychology Majors, Harvard College, Cambridge, MA
1984-2000	Undergraduate Thesis Advisor, Harvard University, Cambridge, MA
2000-	Member of the Board of Honors Tutors, Department of Psychology (Faculty of Arts and Sciences), Harvard University, Cambridge, MA
2012-	Harvard Graduate Women in Science and Engineering (HGWISE), Mentoring Program, Sponsored by the Office of Faculty Development and Diversity, the Graduate School of Arts and Science, and Harvard Integrated Life Sciences, Mentor

Harvard Medical School

1991-2003	Mysell Committee, Department of Psychiatry, HMS, Member
1994-1995	Mysell Committee, Department of Psychiatry, HMS, Chairperson
1994-1996	Career Development Committee, Department of Psychiatry, HMS, Member

1995-1996	Career Development Committee, Department of Psychiatry, HMS, Co-Chair
1995-2005	Promotions and Appointments Committee, Department of Psychiatry at the VA Boston Healthcare System, Brockton Division, HMS, Member
2000	PET Research Oversight Committee, HMS, Member
2000-2005	Joint Committee on the Status of Women, HMS and Harvard School of Dental Medicine, Member
2000-2009	Standing Committee on Faculty Fellowships in the Faculty of Medicine, HMS, Member
2001-	Psychiatry Research Committee, Department of Psychiatry, HMS, Member
2001-2002	Mysell Committee, Department of Psychiatry, Harvard Medical School, Co-Chair
2002-2005	Selection Committee, 50 th Anniversary Program for Scholars in Medicine, HMS, Member
2003-2004	Ad Hoc Evaluation Committee for Professor, HMS, Chair
2003-2006	Subcommittee of Professors, HMS, Member
2004-2005	Psychiatry Research Committee, Department of Psychiatry, HMS, Chair
2005-2009	Selection Committee, Eleanor and Miles Shore 50 th Anniversary Fellowship Program for Scholars in Medicine, HMS, Member
2006-2006	Ad Hoc Evaluation Committee for Professor, HMS, Chair
2007-2007	Ad Hoc Evaluation Committee for Professor, HMS, Member
2007-2008	Ad Hoc Search Committee for Chair of Radiology, Beth Israel Deaconess Hospital, Member
2008-2009	Ad Hoc Evaluation Committee for Professor, HMS, Member
2010-2011	Ad Hoc Evaluation Committee for Professor, HMS, Chair
2010-2011	Ad Hoc Search Committee for Chair of Neurosurgery, Children's Hospital, HMS, Member
2010	Harvard Catalyst Pilot Grants, Reviewer
2012	HMS-Portugal Program in Collaborative Clinical and Translational Research Grants, Review Committee, Member
2014	HMS-Portugal Program in Collaborative Clinical and Translational Research Grants, Review Committee, Member
2014	Council of Mentors, Harvard Medical School, Member

Harvard School of Public Health

2014	Ad Hoc Committee for Professorial Appointment at Harvard School of Public Health
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Veterans Affairs Boston Healthcare System (Jamaica Plain, Brockton, and West Roxbury)

1998-2000	VA Boston Healthcare System Human Studies Subcommittee, Member
2000-2001	VA Boston Healthcare System Institutional Review Board (IRB), Member
2001-2002	VA Boston Healthcare System, Selection Committee for ACOS R&D, Member
2001-2004	VA Boston Healthcare System, Research and Development Committee, Member
2002-2003	VA Boston Healthcare System, Research and Development Committee, Co-Chair
2002-2004	VA Boston Healthcare System, Steering Committee, R&D Committee, Member
2003-2004	VA Boston Healthcare System, Research and Development Committee, Chair
2003-2004	VA Boston Healthcare System, Selection Committee for ACOS R&D, Member
2004-2005	VA Boston Healthcare System, Research and Development Executive Committee, Member
2008-2009	Co-Coordinator Research Methods Course-PGYII Harvard South Shore Residency Training Program, VA Boston Healthcare System, Brockton, MA
2008-2010	Steering Committee, Harvard South Shore Research Pathway Training Program for Residents in Psychiatry, VA Boston Healthcare System, Brockton, MA, Co-Chair
2010-2012	Steering Committee, Harvard South Shore Research Pathway Training Program for Residents in Psychiatry, VA Boston Healthcare System, Brockton, MA, Chair

Brigham and Women's Hospital, Boston, MA

- 1993-1995 Brain Research Committee, Department of Radiology, Brigham & Women's Hospital, Member
- 2005-2009 Research Committee, Department of Psychiatry, Brigham and Women's Hospital, Member
- 2005-2009 Steering Committee, Biomedical Research Institute, Neuroscience Comprehensive Research Center (NCRC), Brigham and Women's Hospital, Member
- 2005-2007 Council of Biomedical Informatics and Functional and Molecular Imaging, Department of Radiology, Brigham and Women's Hospital, HMS, Member
- 2005-2008 fMRI Steering Committee, Department of Radiology, Brigham and Women's Hospital, Member
- 2006-2007 Neuroscience Research Center Working Group, Biomedical Research Institute
- 2007- BRI Bridge Funding Review Committee, Member
- 2007- Neuroscience Work Group, Neuroscience Initiative for Biomedical Research Institute, Member
- 2007- Neuroscience Imaging Service Line Council, Department of Radiology, Brigham and Women's Hospital, Member
- 2009 Research Excellence Awards, Brigham and Women's Hospital, Reviewer
- 2011- Radiology Imaging Core Oversight Committee, and Radiology Core User Committee, BWH Imaging Core and Brigham MRI Research Center (BMRC), Member

Longwood Medical Area, Boston, MA

- 2006-2006 Harvard Longwood Psychiatry Residency Training Program Task Force, Member
- 2006-2010 Harvard Longwood Psychiatry Residency Training Program Advisory Committee, Member
- 2006- Commonwealth Research Center, BI-Deaconess-MMHC, Scientific Advisory Board, Member

Professional Societies:

- 1978-1984 Student Member *American Association for the Advancement of Science*
- 1978-1984 Student Member the *American Psychological Association*
- 1985- *American Psychological Association*, Member
- 1985- *Massachusetts Psychological Association*, Member
- 1989- *Society for Research in Psychopathology*, Member
- 1991-1995 *American Psychopathological Association*, Member
- 1993- *Society of Biological Psychiatry*, Member
- 1994- *American Psychological Society*, Member
- 1999- *International Society for Neuroimaging in Psychiatry*, Member
- 2002- *American College of Neuropsychopharmacology*, Member
- 2005- *Schizophrenia International Research Society*, Member
- 2007- *American College of Neuropsychopharmacology*, Fellow
- 2010- *International College of Neuropsychopharmacology* (CINP), Member
- 2012- *American Neuropsychiatric Association*, Member
- 2013- *International Brain Injury Association* (IBIA), Member

Editorial Boards and Review Service:

Editorial Board

- 1996- *Psychiatry Research: Neuroimaging* (Member)
- 1997-2004 *Schizophrenia Bulletin* (Member)

2001-	<i>Schizophrenia Research</i> (Member)
2006-	<i>Brain Imaging and Behavior</i> (Associate Editor)
2007-	<i>BMC Psychiatry</i> (Member)
2009-	<i>Schizophrenia Bulletin</i> (Member)
2010-	<i>The International Journal of Neuropsychopharmacology</i> (Field Editor)
2011	<i>Schizophrenia Research and Treatment</i> (Guest Editor with Drs. Xu, Haroutunian, and Bartzokis for a Special Issue on <i>Oligodendrocytes in Schizophrenia</i>)
2012	<i>Brain Imaging and Behavior</i> (Guest Editor with Drs. Erin Bigler and David Tate for a Special Issue on <i>Neuroimaging Contributions to Understanding Mild Traumatic Brain Injury</i>)
2012-	<i>World Journal of Psychiatry</i> , Member
2014	<i>Schizophrenia Research</i> (Guest Editor with Dr. Marek Kubicki for Special Issue on <i>White Matter Abnormalities in Schizophrenia</i>)
2014-	<i>Journal of Psychology and Clinical Psychiatry</i> (Member)

Ad Hoc Reviewer

<i>Archives of General Psychiatry</i> (now <i>JAMA-Psychiatry</i>)	<i>American Journal of Psychiatry</i>
<i>Brain Imaging and Behavior</i>	<i>Schizophrenia Research</i>
<i>Cerebral Cortex</i>	<i>Schizophrenia Bulletin</i>
<i>Journal of the American Medical Association (JAMA)</i>	<i>Psychiatric Research</i>
<i>The New England Journal of Medicine</i>	<i>Journal of Psychiatric Research</i>
<i>Biological Psychiatry</i>	<i>Brain</i>
<i>Proceedings of the National Academy of Sciences</i>	<i>Development and Psychopathology</i>
<i>Journal of Abnormal Psychology</i>	<i>NeuroImage</i>
<i>The Cleft Palate-Craniofacial Journal</i>	<i>PlosONE</i>
<i>Journal of Psychophysiology</i>	<i>Psychosomatic Medicine</i>
<i>Neuropsychopharmacology</i>	<i>Neurology India</i>
<i>Neuroreport</i>	<i>Cognitive Brain Research</i>
<i>Biological Psychology</i>	<i>Harvard Review of Psychiatry</i>
<i>Journal of Nervous and Mental Diseases</i>	<i>Neurobiology of Disease</i>
<i>Epilepsia</i>	<i>Psychological Bulletin</i>
<i>Psychiatry Research: Neuroimaging</i>	<i>Behavioral Neuroscience</i>
<i>Journal of Child Psychology and Psychiatry</i>	<i>Neuropsychobiology</i>
<i>Neuroscience Letters</i>	<i>Hippocampus</i>
<i>American Journal of Medical Genetics</i>	<i>European Neuropsychopharmacology</i>
<i>Neuropsychology</i>	<i>Future Neurology</i>
<i>International Journal of Neuropsychopharmacology</i>	<i>Neuropsychiatric Genetics</i>
<i>Psychological Reports: Perceptual and Motor Skills</i>	<i>PLoS Medicine</i>
<i>Journal of International Neuropsychological Society</i>	<i>Genes, Brain, and Behavior</i>
<i>European Archives of Psychiatry and Clinical Neuroscience</i>	<i>Pediatrics</i>
<i>Psychiatry Interpersonal and Biological Processes</i>	<i>Developmental Psychopathology</i>
<i>Progress in Neuro-Psychopharmacology & Biological Psychiatry</i>	<i>Neurodegenerative Diseases</i>
<i>Journal of Neurodegenerative Diseases</i>	

Awards and Honors:

1973	<i>Phi Beta Kappa</i> , Eta Chapter, Wellesley College
1973	Durant Scholar (<i>Summa cum laude</i>), Wellesley College
1978-1980	Merit Fellowship, Harvard University
1980-1982	<i>The George & Cecile Naumburg Fellowship for Doctoral Work in the Behavioral Sciences</i>
1982-1983	<i>The Peter B. Livingston Dissertation Research Fellowship</i>

1982-1983	<i>The Harvard-Danforth Award for Excellence in Teaching</i>
1984-1986	NIMH T32 National Research Service Award (NRSA) - Clinical Research Training Fellow in Biological Psychiatry, Massachusetts Mental Health Center, Boston, MA
1988	Invited participant, <i>The James S. McDonnell Foundation Summer Institute in Cognitive Neuroscience</i> , Harvard University
1988-1993	NIMH Research Scientist Development Award (K01)
1989	NIMH Young Investigator Award, Internal Congress of Schizophrenia Research
1991	<i>William F. Milton Fund Award for Scientific Research</i> , Harvard University
1992	<i>Thomas Temple Hoopes Prize for Excellence in the Work of Undergraduates & the Art of Teaching</i> (as Faculty Supervisor shared award with I-han Chou for her <i>Summa cum laude</i> Senior Honor's Thesis submitted to Harvard College)
1992-1995	<i>Theodore and Vada Stanley Foundation Research Award for Research on Serious Mental Diseases</i>
1994-1999	NIMH Independent Scientist Award (K02)
1994-1999	NIMH First Award
1997-2004	<i>Senior Mentor for the Stanley Scholars Program</i> , Stanley Medical Research Institute
1998	<i>Fifth Recipient of the Joseph Zubin Memorial Fund Award for Research in Psychopathology</i> , Department of Psychiatry, NY State Psychiatric Institute, Columbia University, NY, NY (http://www.wpic.pitt.edu/research/biometrics/zubin_awards.htm)
1999	<i>William F. Milton Fund Award for Scientific Research</i> , Harvard University
1999-2004	NIMH Independent Scientist Award (K02)
2004-2009	NIMH Senior Scientist Award (K05)
2008	<i>Ph.D. Honors Lecture in Recognition of Honor and Achievement in the Field of Psychological Science</i> , Universidade do Minho, Braga, Portugal
2008-2009	<i>William Silen Lifetime Achievement Award for Mentoring</i> , Harvard Medical School (http://www.mfdp.med.harvard.edu/awards/mentoring/past.html)
2009-2011	<i>National Alliance for Research in Schizophrenia and Depression</i> (NARSAD) <i>Distinguished Investigator Award</i>
2012	<i>Catedra Professor Carlos Lloyd Braga Honorary Chair</i> , Universidade do Minho, Braga, Portugal (http://www.uminho.pt/en/uminho_en/carlos-lloyd-braga-foundation) (http://www.fclb.uminho.pt/Default.aspx?tabid=4&pageid=56&lang=pt-PT)
2013	<i>The Stuart T. Hauser, M.D., Ph.D. Mentorship Award</i> , Departments of Psychiatry, Harvard Medical School
2013	<i>Research Award</i> , Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School

PART II: RESEARCH, TEACHING, AND OTHER CONTRIBUTIONS**Report of Research:***Major Research Interests.*

1. The Relationship Between Cognitive, Structural, and Neurophysiological Measures in Schizophrenia
2. MRI Studies in Schizophrenia, Including Image Processing Analyses
3. Evoked Potential Studies in Schizophrenia
4. Biological Markers and Psychiatric Disorders
5. Thought Disorder in Schizophrenia
6. Validity and Reliability of Psychiatric Diagnoses
7. Premorbid Development and Its Association with Onset and Course of Schizophrenia
8. Schizotypal Personality Disorder
9. The Relationship Between Cognitive, Structural, and Neurophysiological Measures in First Episode Psychoses
10. MR Brain Diffusion Tensor Imaging Studies in Schizophrenia and Related Disorders
11. MRI Studies in Post-Traumatic Stress Disorder
12. Transcranial Magnetic Stimulation Studies of Motor and Cognitive Functioning in Normal Healthy Controls, Neurosurgery Patients, and Patients Diagnosed with Schizophrenia
13. Cognitive and Behavioral Correlates of MRI Brain Abnormalities in William's Syndrome
14. Cognitive, Behavioral, and Genetic Correlates of MRI Brain Abnormalities in Velocardiofacial Syndrome
15. Directing the development of image processing tools for MRI and DTI
16. Application of Diffusion Imaging to Mild Traumatic Brain Injury, including repetitive brain injury, the latter sometimes associated with chronic traumatic encephalopathy

Narrative Description of Research. Schizophrenia is a major public health problem that affects close to 1% of the general population and has devastating effects on the psychological and financial resources of the patient, family, and larger community. Unfortunately there is still no clear understanding of the pathology although recent research has made it increasingly clear that biological factors may play an important role. One promising area of research has focused on the detection of abnormalities in the brains of patients afflicted with schizophrenia. Here, both post-mortem and magnetic resonance (MR) structural imaging studies suggest that temporal lobe and temporal lobe limbic system abnormalities, especially pronounced on the left, may be implicated in the pathophysiology of schizophrenia.

The broad goal of Dr. Shenton's research program has been to apply new imaging techniques to the study of schizophrenia in order to determine and to localize brain abnormalities which likely underlie the symptoms and disordered behavior observed in patients diagnosed with schizophrenia. Accordingly, this investigator and her research team have focused their research efforts in trying to define and to localize further brain abnormalities in the temporal lobe in patients with schizophrenia. Newly developed image processing techniques, originally developed for the analysis of multichannel remote sensing data (i.e., satellites), have been employed to analyze high spatial resolution magnetic resonance (MR) scans (1.5-mm and 2-mm slices). The application of these image processing techniques to the investigation of schizophrenia has been particularly helpful because these techniques not only exploit more fully information contained in MR scans, but they also offer more precise and accurate measurements, factors important to schizophrenia where brain abnormalities are often more subtle, and harder to detect, than for other pathophysiological disorders, and where, consequently, precise and accurate measurements become that much more essential.

These techniques have now been used by Dr. Shenton and her coworkers to make volumetric measurements of: (1) whole brain for gray matter, white matter and CSF; (2) temporal lobe (gray and white matter); (3) amygdala-hippocampal complex, (4) parahippocampal gyrus, (5) superior temporal gyrus; (6) cingulate gyrus; (7) parietal lobe; and (8) basal ganglia structures. In addition, an analysis of the gyral pattern in the cortical gray matter surface of the temporal lobes has been completed. Results demonstrate that schizophrenic patients, compared to normal controls, show reductions in volume in temporal lobe limbic system structures (amygdala-hippocampal formation and parahippocampal gyrus), and in superior

temporal gyrus. These abnormalities were found to be more pronounced on the left, were correlated with each other, and there was an observed correlation between measures of formal thought disorder and left superior temporal gyrus volume. The latter finding suggested to the investigator and her coworkers that there was damage to an interconnected neural network that may be important to verbal associations and verbal memory, which may account for the loose associations so often observed in schizophrenia. This line of research is continuing and newer methods are being developed for analyzing the brain, including warping techniques, which may replace the laborious tracing of smaller regions of the brain. Additionally, measures of shape are being applied to brain regions of interest as such measures may be more sensitive than measures of volume alone and they may reflect neurodevelopmental anomalies in the brains of patients diagnosed with schizophrenia. This research has been extended to first onset cases of schizophrenia as well as to individuals diagnosed with schizotypal personality disorder. The former focus is important, as it will allow investigators to discern whether or not brain abnormalities are evident early in the course of the illness, prior to confounding variables such as a chronic illness and long-term effects of neuroleptics. The latter focus is important, as it will allow investigators to discern similarities and differences in a disorder that is genetically linked to schizophrenia but where psychosis is not observed. Finally, Dr. Shenton is also working closely with collaborators investigating hippocampal abnormalities in individuals diagnosed with post-traumatic stress disorder. A morphometric brain study of the amygdala-hippocampus in monozygotic twins was conducted where one twin has PTSD as a result of combat exposure in the Vietnam War, and the other did not. Findings suggested that given that the unaffected co-twin showed reduced volume in the amygdala-hippocampal complex, there may be some individuals who have a predisposition to developing PTSD. Other morphometric studies of brain abnormalities in clinical populations include new studies investigating the cognitive and behavioral correlates of brain abnormalities in William's Syndrome patients and in velocardiofacial syndrome, the latter a genetic disorder that, outside of monozygotic twins, has the highest rates for developing schizophrenia.

Work using transcranial magnetic stimulation (TMS) has also been conducted by Dr. Shenton and colleagues in an attempt to understand further cognitive processes are interrupted by TMS, thus affording the opportunity to link processes that occur in the millisecond range with specific loci in the brain. This program of research is being developed to examine motor maps but will be extended to map cortical speech areas in order to determine whether there are differences in language processing between patients with schizophrenia and a normal comparison group. New studies using MR diffusion tensor imaging (MR-DTI) are also being applied to neuropsychiatric disorders. This is a relatively new imaging technique that is important for examining white matter fiber tracts in the brain in schizophrenia. More specifically, unlike conventional MRI, where white matter appears uniform and homogeneous, the novel technology of MR-DTI affords an opportunity to investigate and to quantify normal and abnormal white matter fiber tracts *in vivo* in the human brain. Here Dr. Shenton and her collaborators are focusing on assessing anisotropic diffusion in the uncinate fasciculus, the most prominent white matter fiber tract connecting the frontal and temporal lobe, as well as other fiber tracts likely implicated in schizophrenia. Findings reveal a group by side interaction as well as a lack of normal left greater than right asymmetry in patients with schizophrenia. These findings demonstrate the importance of investigating white matter fiber tracts *in vivo* in schizophrenia, and support the hypothesis of a disruption in normal connectivity between temporo-frontal brain regions in schizophrenia. This work is being extended to first episode psychotic patients and to schizotypal personality disorder.

Another area of research that Dr. Shenton and her colleagues, including Drs. Ross Zafonte, Inga Koerte, Robert Stern, Alex Lin, Ofer Pasternak, Paul Echlin, and Howard Eisenberg, are conducting is in the area of mild traumatic brain injury (mTBI). Here, the main damage to the brain is diffuse axonal injury, which is best characterized by diffusion imaging techniques. Mild TBI, in fact, is difficult to characterize using conventional CT and MRI because these imaging techniques are not optimal for detecting diffuse axonal injury, particularly as evinced by mild TBI. Diffusion tractography techniques that can quantify damage along fiber tracts is thus an important new area of research that may add to our understanding of TBI. Dr. Shenton and her colleagues are part of a large PTSD/TBI Clinical Consortium supported by the Department of Defense, which includes 10 sites across the country where neuroimaging will be conducted to understand better the neurobiology of TBI. Work is also being done with Dr. Stern at Boston University investigating chronic traumatic encephalopathy using neuroimaging techniques in a sample of retired National Football Players (NFL) who have cognitive impairments and symptoms that are likely associated with repetitive brain trauma. A study of professional soccer players without concussion (with Dr. Inga Koerte and colleagues in Germany), as well as a study of ice hockey varsity university players in Canada (with Drs. Paul Echlin, Ofer Pasternak, Karl Helmer, and others), pre- and post-season have also been conducted which demonstrate that repetitive head trauma even at subconcussive levels leads to changes in the white matter integrity of the brain. A new PET study of tau ligands in the brain is just underway to determine whether or not the tau deposits observed in the post-mortem brains of deceased NFL players who experienced

many clinical and cognitive symptoms will be observed in living NFL players using a new PET tau ligand so as to be able to identify early changes in tauopathy in the brains of living NFL players to then stage possible treatment and efficacy studies to prevent the cascade of progressive changes observed in chronic traumatic encephalopathy.

By applying these new techniques to assess heretofore unmeasurable differences between the brains of normal control subjects and patients afflicted with neuropsychiatric disorders including schizophrenia, mild TBI, and repetitive trauma from TBI, Dr. Shenton and her colleagues hope to understand better the pathophysiology of schizophrenia and other neuropsychiatric disorders.

Research Funding Information:

Past Grant Support.

1986-1990	NIMH R01 MH 40799 Neurophysiological Studies of Schizophrenia (PI: Dr. Robert McCarley)	Co-Investigator
1988-1993	NIMH K01 MH 00746 Schizophrenia: Clinical Symptoms & Brain Mechanisms	Principal Investigator
1988-1993	Veterans Administration Merit Review Neurophysiology of Behavior (PI: Dr. Robert McCarley)	Co-Investigator
1990-1993	NIMH R01 MH 40799 Neurophysiological Studies of Schizophrenia (PI: Dr. Robert McCarley)	Co-Investigator
1990-1993	Scottish Rite Foundation Computer Aided Image Analysis of Magnetic Resonance Brain Scans in Schizophrenia	Principal Investigator
1991-1992	William F. Milton Fund Award Analysis of Morphometric Information from MR Brain Images in Schizophrenia Using Newly Developed Techniques	Principal Investigator
1992-1994	Stanley Foundation MR Image Processing Techniques Applied to the Volumetric Analysis of the Superior Temporal Gyrus in Normal Controls and Patients Afflicted with Schizophrenia	Principal Investigator
1992-1995	The Whitaker Foundation Development of Computerized Image Processing Methods for the Quantitative Analysis of Brain Magnetic Resonance Images for the Diagnosis of Schizophrenia (PI: Dr. Ron Kikinis)	Co-Principal Investigator
1992-1997	NIMH P01 MH 31154 Collaborative Biological Research in Schizophrenia (PI: Dr. Philip Holzman) Project: Electrophysiology Studies in Schizophrenia (PI: Dr. Robert McCarley, Co-PI: Shenton)	Co-Principal Investigator, Project
1993-1997	NIMH R01 MH 40799 Neurophysiological Studies of Schizophrenia (PI: Dr. Robert McCarley)	Co-Investigator
1993-1998	Veterans Administration Merit Review Neurophysiology of Behavior (PI: Dr. Robert McCarley)	Co-Investigator

1994-1999	NIMH R29 MH 50740 Computerized Image Analyses of MR Scans in Schizophrenia	Principal Investigator
1994-1999	NIMH K02 MH 01110 Clinical Symptoms & Brain Abnormalities in Schizophrenia	Principal Investigator
1994-1999	NIMH R01 MH 52807 Biological Basis of Schizotypal Personality Disorder (PI: Dr. Robert McCarley)	Co-Principal Investigator
1995-1997	Scottish Rite Foundation Study of Cortical Speech Localization and Verbal Processing Using Rapid-Rate Transcranial Magnetic Stimulation in Normal Controls and Schizophrenic Patients	Principal Investigator
1995-1997	Supplement to NIMH R29 MH 50740 Research Supplement to Promote the Recruitment of Individuals with Disabilities into Biomedical Research Careers	Principal Investigator
1995-1997	NARSAD National Alliance for Schizophrenia and Depression, Young Investigator Award A 3D MRI Study of Temporal Lobe Structures in Schizophrenia and Schizotypal Personality Disorder (PI: Dr. Chandlee Dickey; Co-Mentors: Drs. Robert McCarley and Martha Shenton)	Co-Mentor
1995-2000	VA Center for Basic and Clinical Neuroscience Studies of Schizophrenia The Neuroscience of Schizophrenia (PI: Dr. Robert McCarley)	Scientific Co-Director
1996-1998	NIMH R01 MH 50379 Prospective MRI Study of Hippocampus After Mental Trauma (PI: Dr. Arieh Shalev)	Principal Investigator (sub-contract)
1996-2007	NIMH T32 MH 016259 Clinical Research in Biological and Social Psychiatry (PI: Dr. Stuart T. Hauser)(Grant funded from 07/01/1980-06/30/2006) (2007-2008, not funded: Funded again 07/01/08-06/30/2013, see below)	Co-Investigator
1997-2004	Senior Mentor, Stanley Scholars Program	Principal Investigator
1998-2001	VA Merit Award MRI Hippocampal Volume in Twins Discordant for Combat Exposure and PTSD (PI: Dr. Mark Gilbertson)	Co-Investigator
1998-2003	NIMH R01 MH 40799 Neurophysiological Studies of Schizophrenia (PI: Dr. Robert W. McCarley)	Co-Investigator
1998-2003	VA Merit Award MRI Anatomy of Schizophrenia (PI: Dr. Robert McCarley)	Co-Investigator

1998-2003	NIMH P01 MH 31154 Collaborative Biological Research in Schizophrenia (PI: Dr. Philip Holzman) Project: Dysmorphology Studies in Schizophrenia (PI: Dr. Curtis Deutsch)	Co-Investigator
1999-2000	William F. Milton Fund Award MR Diffusion Tensor Imaging in Schizophrenia	Principal Investigator
1999-2001	NARSAD National Alliance for Schizophrenia and Depression, Young Investigator Award (PI: Dr. Melissa Frumin; Co-Mentors: Drs. Martha Shenton and Robert McCarley)	Co-Mentor
1999-2004	NIMH R01 MH 50740 Computerized Image Analyses of MR Scans in Schizophrenia	Principal Investigator
1999-2004	NIMH K02 MH 01110 Clinical Symptoms & Brain Abnormalities in Schizophrenia	Principal Investigator
2000-2003	VA Merit Award MR Brain Diffusion Tensor Imaging in Schizophrenia	Principal Investigator
2000-2003	Binational Science Foundation Volumetric Analysis of Hippocampal Volume in Posttraumatic Stress Disorder (PI: Dr. Omer Bonne)	American-PI
2000-2004	NIMH R01 MH 60775 Brain Midline Malformations in Schizophrenia (PI: Dr. Curtis Deutsch)	Co-Investigator
2001-2002	Infrastructure Suppl.: NIMH R01 5074 Computerized Image Analyses of MR Scans in Schizophrenia	Principal Investigator
2001-2003	CA R21 89449 Mutual Information Based Image Processing for fMRI (PI: Dr. William Wells III)	Co-Investigator
2001-2003	NIMH R01 MH 50379 Prospective MRI Study of Hippocampus After Mental Trauma (PI: Dr. Arieh Shalev)	Co-Investigator
2001-2003	NARSAD National Alliance for Research in Schizophrenia and Depression, Young Investigator Award A magnetic Resonance Diffusion Tensor Study of the Cingulate Fasciculus in Schizophrenia (PI: Dr. Marek Kubicki; Co-Mentors: Drs. Martha Shenton and Robert McCarley)	Co-Mentor
2000-2005	NIMH R01 MH 52807 Biological Basis of Schizotypal Personality Disorder (PI: Dr. Robert McCarley)	Co-Principal Investigator
2002-2005	VA Merit Award Structural Brain MRI and Neurocognitive Function in Female Nurse Vietnam Veterans (PI: Dr. Mark Gilbertson)	Consultant

2002-2005	NIH/NIA Harvard Older Americans Independence Center (PI: Dr. Lipzitz) (PI on Project #1: Dr. Milberg)	Collaborator
2003-2006	R03 MH068464 White Matter Myelin Abnormalities in Schizophrenia (PI: Dr. Marek Kubicki) (One Year No Cost Extension to 2006)	Co-Investigator
2003-2006	VA Research Enhancement Award Program "Neuroimaging Studies in Schizophrenia" (PI: Dr. Robert McCarley)	Co-Principal Investigator
2003-2006	NARSAD National Alliance for Schizophrenia and Depression, Young Investigator Award Understanding the Nature of White Matter Abnormalities in Cingulate Fasciculus in Schizophrenia (PI: Dr. Marek Kubicki; Co-Mentors: Drs. Martha Shenton and Robert McCarley)	Co-Mentor
2003-2007	NIMH R01 MH 40799 Neurophysiological Studies of Schizophrenia (PI: Dr. Robert W. McCarley)	Co-Investigator
2003-2008	VA Merit Award MR Brain Diffusion Tensor Imaging in Schizophrenia	Principal Investigator
2003-2008	VA Merit Award MRI Anatomy of Schizophrenia (PI: Dr. Robert McCarley)	Co-Investigator
2004-2005	NIMH R01 MH 50740 Computerized Image Analyses of MR Scans in Schizophrenia" [No Cost Extension]	Principal Investigator
2004-2010	National Alliance for Medical Imaging Computing (NA-MIC), U54 GM072977-01, NIGHS/NIH (PI: Ron Kikinis). PI of Project 3-A: Brain Connectivity in Schizophrenia (2004-2007) Project: Velocardiofacial Syndrome (PI: Dr. Marek Kubicki) (2007-2010) (Co-Investigator: Dr. Martha E. Shenton)	Core-Principal Investigator
2005-2005	Supplement to NIMH R01 50740 Computerized Image Analyses of MR Scans in Schizophrenia Minority Supplement	Principal Investigator
2004-2009	NIH K05 MH 070047 Clinical Symptoms & Brain Abnormalities in Schizophrenia	Principal Investigator
2005-2009	VA Merit Award Context and the Hippocampus in Unremitting Posttraumatic Stress Disorder (PI: Dr. Mark Gilbertson)	Consultant
2005-2010	NIMH R01 MH 52807 Biological Basis of Schizotypal Personality Disorder (PI: Dr. Robert McCarley)	Co-Principal Investigator

2005-2010	NIMH R01 MH 50740 Computerized Image Analyses of MR Scans in Schizophrenia (1 year No-Cost Extension to 2011)	Principal Investigator
2006-2009	Supplement to NIMH R01 50740 Computerized Image Analyses of MR Scans in Schizophrenia Reentry to Biomedical Research (Dr. Zora Kikinis funded)	Principal Investigator
2009-2009	Supplement to NIMH R01 50740 Computerized Image Analyses of MR Scans in Schizophrenia NIH American Recovery and Reinvestment Act of 2009 (ARRA) Administrative Supplement to R01MH 50740 for Students and Science Educators (NOT-OD-09-060) 2008-2010 (supported six students for hands on research experience in the Psychiatry Neuroimaging Laboratory)	Principal Investigator
2008-2010	NARSAD National Alliance for Schizophrenia and Depression Young Investigator Award White Matter Changes in Subjects with Neuregulin 1 Haplotype HAP-ICE and ErbB4 Schizophrenia Risk Haplotypes (PI: Dr. Zora Kikinis; Co-Mentors: Drs. Martha Shenton, Gabriel Corfas and Raj Kucherlapati)	Co-Mentor
2008-2010	NIMH R21 MH 077979 Behavioral and fMRI study: Social Reciprocity in Schizotypal Personality Disorder” (PI: Dr. Chandlee Dickey)	Co-Investigator/Contributor
2006-2011	Fogarty International Center FIC NIH 2 D43 TW05807 ICOHRTA Research Training Program at Children’s Hospital Boston with Major Foreign Collaborators (MFC) in Turkey in Partnership with NIMH International Mental Health and Developmental Disabilities Research Training Program (PI: Dr. Kerim Munir)	US Program Faculty/Mentor
2006-2011	VA Schizophrenia Center Grant Neuroimaging Insights into Schizophrenia & Treatment Implications (PI: Dr. Robert W. McCarley)	Co-Principal Investigator
2007-2012	NIH R01 MH 074794 Novel DT-MRI Analyses of White Matter in Schizophrenia (PI: Dr. Carl-Fredrik Westin)	Co-Investigator/Contributor
2007-2012	NIMH R01 MH 40799 Neurophysiological Studies of Schizophrenia (PI: Dr. Robert McCarley)	Co-Investigator
2007-2012	NIH 1P50 MH 080272 NIH Mental Health Centers for Interventional Development and Applied Research (CIDAR) Vulnerability to Progression in Schizophrenia” (PI: Dr. Robert W. McCarley) (Project PI: Vulnerability to White Matter Progression in Schizophrenia, and Core PI: Imaging Core) (Continued through No Cost Extension to 6/30/2013)	Project PI and Core PI
2008-2011	FIRCA R03 TW008134 MRI and Neurological Findings in Schizophrenia, ADHD, and Healthy Controls Study conducted in Istanbul, Turkey (Site PI: Dr. Ozgur Oner) (Continued through No Cost Extension to 2012)	Principal Investigator/Mentor

2008-2012	National Health & Medical Research Council Australian Government MHMRC Training Fellowship (PI: Dr. Thomas Whitford)	Supervisor/Mentor
2008-2013	NIMH T32 MH 016259-29 Clinical Research in Biological and Social Psychiatry Name change to: The Stuart T. Hauser Clinical Research Training Program in Biological & Social Psychiatry. Grant entering 29 th year: (07/01/1980-6/30/2013) (2007-2008, not funded) Dr. Shenton was a fellow from 1984-1986 on this grant and then an investigator and Associate Director on this grant from 1996 to 2007. The grant was renewed in 2008. At this time, Dr. Shenton became PI and Co-Director following the untimely death of Dr. Stuart Hauser.	Principal Investigator
2009-2011	NIH/NIMH R21 MH083205 Language and Risk in Schizophrenia (PI: Dr. Lynn DeLisi)	Investigator
2009-2012	VA Merit Award MR Brain Imaging of Frontal-Striatal-Thalamic Circuits in Schizophrenia (PI: Dr. James Levitt)	Co-Investigator
2009-2011	NIH R21 MH083205 Language and Risk for Schizophrenia (PI: Dr. Lynn DeLisi)	Investigator
2009-2011	CIMIT Center for Integration of Medicine and Innovative Technology Solider in Medicine Award Traumatic Brain Injury Diagnosis with Diffusion MRI (PI: Dr. Sylvain Bouix)(Continued through No Cost Extension – 2012)	Mentor
2009-2011	NARSAD National Alliance for Research in Schizophrenia and Depression Distinguished Investigator Award (Continued through no cost extension to 2013) A Novel Application for Diffusion-Weighted Functional Magnetic Resonance Imaging to Schizophrenia: A More Robust Measure of Brain Activation	Principal Investigator
1998-2013	NIH P41 RR13218 Neuroimaging Analysis Center (PI: Dr. Ferenc Jolesz, Co-PI Dr. Ron Kikinis) Project: Interactive Digital Anatomy Atlas of the Brain (PI: Dr. Martha E. Shenton) Project: Schizophrenia (PI: Dr. Martha E. Shenton) (1998-2003 Dr. Shenton was PI on the Schizophrenia Project) (2003-2013 Dr. Shenton was a Collaborative Partner and Investigator)	Principal Investigator (2projects)/Investigator
2003-2013	NIH P41 RR13218 Neuroimaging Analysis Center (PI: Dr. Ron Kikinis) Project: The Development of White Matter Tools Based on Diffusion MRI (PI: Dr. Carl-Fredrik Westin)	Co-Investigator/Collaborative Partner
2009-2014	VA Merit Award MR Brain Diffusion Tensor Imaging in Schizophrenia	Principal Investigator

Current Grant Support.

2008-2013	W81XWH-08-2-0159 Department of Defense Harvard Clinical Defense Consortium (HCDC): PTSD/TBI Clinical Consortium (PI: Dr. Ross Zafonte, Co-PIs: Drs. Martha Shenton and Roger Pitman) (Overall PI: Dr. Murray Stein, UCSD)	Co-Principal Investigator (NCE 09/30/2015)
2009-2014	NIMH R01 MH 082918 Computational Morphometry in Schizophrenia and Related Disorders (PI: Dr. Sylvain Bouix)	Co-Principal Investigator (NCE through 2/2015)
2009-2013	NIA R01 AG034554 Social and Neural Underpinnings of Octogenarian Wellbeing (PI: Dr. Robert Waldinger)	Co-Investigator (NCE through 2014)
2009-2013	W81XWH-08-2-0159 Department of Defense Neuroimaging Leadership for the 10 PTSD/TBI Clinical Consortium Sites (Other PIs: Drs. Ron Kikinis and Bruce Rosen)	PI Neuroimaging Leadership Core (NCE to 09/30/15)
2010-2011	CIMIT Center for Integration of Medicine and Innovative Technology Improving Imaging of Diffuse Axonal Injury in Traumatic Brain Injury (Co-PI: Drs. Bruce Kristal and Ross Zafonte)(Continued through NCE to 2014)	Principal Investigator
2010-2012	NARSAD National Alliance for Schizophrenia and Depression Young Investigator Award Investigating the Utility of Two Neurophysiological Biomarkers in Predicting Transition to Schizophrenia in Ultra-High Risk Individuals (PI: Dr. Thomas Whitford; Co-Mentors: Drs. Martha Shenton, Christos Pantelis and Judith Ford) (Continued through NCE to 2014)	Co-Mentor
2010-2014	NIA R01 AG034155 Identifying Biomarkers of Alzheimer's in Insulin Resistant Patients Using MRI (PI: Dr. Gail Musen)	Co-Investigator
2011-2012	CIMIT Center for Integration of Medicine and Innovative Technology Diagnosis of Diffuse Axonal Injury Using Robust Tract-Based Quantification of Diffusion Tensor Imaging (PI: Dr. Lauren O'Donnell)(Continued through NCE to 2014)	Collaborator
2011-2012	CIMIT Center for Integration of Medicine and Innovative Technology Neurochemical and Multimodal Markers for Chronic Traumatic Encephalopathy (PI: Dr. Alexander Lin)(Continued through NCE to 2014)	Co-Investigator
2011-2013	W81XWH-08-2-0159 Project: Brain Indices of Risk for PTSD Following Mild TBI (NCE to 09/30/15) (PI: Dr. Connie Duncan)	Co-PI and PI Subaward
2011-2013	W81XWH-08-2-0159 Project: Post-Processing of Images for Clinical Consortium (NCE to 09/30/15) (Other PIs: Drs. Ron Kikinis and Bruce Rosen)	Principal Investigator

2011-2013	W81XWH-08-2-0159 Pilot Project: Novel Functional and Structural Biomarkers of Neuroinflammation and White Matter Change in TBI: A Potential New Diagnostic and Therapeutic Approach (Co-PIs: Drs. Emily Stern and Ross Zafonte) (NCE to 09/30/15)	Principal Investigator
2011-2013	W81XWH-08-2-0159 Project: A Randomized-Clinical Trial of Glyburide (RP-1127) for TBI (PI: Dr. Howard Eisenberg)	Principal Investigator of Subaward (NCE to 09/30/15)
2011-2014	NINDS R01 NS078337-01 Project: Chronic Traumatic Encephalopathy: Clinical Presentation and Biomarkers (PI: Dr. Robert Stern)	Co-Investigator (NCE to 09/30/2015)
2011-2015	NIMH R01 MH090291-01 Project: Fetal Hormonal Programming of Sex Differences in Aging of the Memory Circuitry (PI: Dr. Jill Goldstein)	Co-Investigator
2012-2015	NIH/NIMH 5R01MH64824-11 Project: Biomarkers for Psychosis in Velocardiofacial Syndrome (PI: Dr. Wendy Kates)	Consultant
2013-2015	NARSAD National Alliance for Schizophrenia and Depression Young Investigator Award Free-Water as a Novel Imaging Biomarker for the Investigation of Inflammation and Degeneration Dynamics in Schizophrenia (PI: Dr. Ofer Pasternak; Co-Mentors: Drs. Martha Shenton and Marek Kubicki)	Co-Mentor
2012-2016	NIMH 1R01MH09238 Genetic Determinants of Schizophrenia Intermediate Phenotypes (PI: Dr. Tracey Petryshen)	Co-Investigator
2012-2017	NIH R01 MH 074794 Novel DT-MRI Analyses of White Matter in Schizophrenia (PI: Dr. Carl-Fredrik Westin)	Significant Contributor
2012-2017	R01 MH 097979 Taking Advanced Diffusion Imaging to the Clinic for Pediatric Patients with ADHD (PI: Dr. Yogesh Rathi)	Significant Contributor
2013-2016	F31 NS 081957 Ruth L. Kirchstein National Research Service Award for Individual Pre-Doctoral Fellows Frontal Lobe Neuroimaging as a Biomarker of Chronic Traumatic Encephalopathy (PI: Dr. Julie Stamm; Co-Sponsors Drs. Robert Stern and Martha Shenton)	Co-Sponsor
2013-2016	NIMH MH 101052 Validating Biomarkers for the Prodrome and Transition to Psychosis in Shanghai (PI: Dr. Larry Seidman)	Consultant and then Co-Investigator
2013-2018	VA Career Development Award Providence VAMC PTSD and the Default Network: Developing Imaging Phenotypes (PI: Dr. Noah Philip)	Co-Mentor

2013-2018	K23 MH 097844 Cognitive Processing Therapy for PTSD with Co-Morbid Mild Traumatic Brain Injury (PI: Dr. Kaloyan Tanev)(Co-Mentors: Drs. Martha Shenton and Roger Pitman)	Co-Mentor
2013-2018	NIMH T32 MH 016259-29 Clinical Research in Biological and Social Psychiatry Name change to: The Stuart T. Hauser Clinical Research Training Program in Biological & Social Psychiatry. Grant entering 34 th year: (07/01/1980-6/30/2018) (2007-2008, not funded) Dr. Shenton was a fellow from 1984-1986 on this grant and then an investigator and Associate Director on this grant from 1996 to 2007. The grant was renewed in 2008. At this time, Dr. Shenton became PI and Co-Director following the untimely death of Dr. Stuart Hauser.	Principal Investigator
2014-2016	DoD PT120517-37 Chronic Effects of Neurotrauma Consortium (CENC) Congressionally Directed Medical Research Program (CDMRP) Using Individual DTI Profiles of Mild TBI to Guide Targeted, Non-Invasive Brain Stimulation for Veterans with Persistent Post-Concussive Symptoms (PI: Dr. David Tate, Co-PI: Dr. Sylvain Bouix)	Co-Investigator
2014-2018	W81XWH-13-2-0063 Congressionally Directed Medical Research Programs (CDMRP) Traumatic Brain Injury Award “Tau Imaging of Chronic Traumatic Encephalopathy” (Co-Partnering PI: Dr. Robert Stern)	Principal Investigator
2014-2018	VA Merit Award Development of MR Biomarkers of Brain Injury in Acute and Chronic mTBI	Principal Investigator
2014-2019	NIH MH K23 10061 Speech and Cognitive Networks in Hallucinators Across the Psychoses Spectrum. (PI: Ann Shin; Co-Mentors: Drs. Martha Shenton, Dos Ongur, John Gabrieli, & Randy Buckner)	Co-Mentor
2014-2019	NIMH U01 MH 081928-06 Predictors and Mechanisms to Psychosis PI: Dr. Tyrone Cannon (Site PI in Boston: Dr. Larry Seidman)	Co-Investigator
2015-2017	NARSAD National Alliance for Schizophrenia and Depression Young Investigator Award Computational methods for structural brain morphology in neurodevelopment (PI: Dr. Peter Savadjiev; Mentor: Dr. Martha Shenton)	Mentor

Report of Teaching:*Local Contributions**Tufts University*

1975-1976

Motivation, Psychology Department, Tufts University, Medford, MA
Teaching Fellow
50 undergraduates
5 hours/week for two semesters

Brandeis University

1985-1986

Abnormal Psychology, Psychology Department, Brandeis University, Waltham, MA
Visiting Lecturer
45 undergraduates
20 hours/week for two semesters

Harvard University

1979-1980

Stress and Illness, Psychology & Social Relations, Harvard University, Cambridge, MA
Teaching Fellow
75 undergraduates
5 hours/week for one semester

Human Nature, Psychology and Social Relations, Harvard University, Cambridge, MA
Teaching Fellow

75 undergraduates
5 hours/week for one semester

1980-1981

Methods in the Social Sciences, Psychology and Social Relations, Harvard University, Cambridge, MA
Teaching Fellow

35 undergraduates
10 hours/week for one semester

Developmental Psychopathology, Psychology and Social Relations, Harvard University, Cambridge, MA
Teaching Fellow
40 undergraduates
5 hours/week for one semester

1981-1982

Sophomore Tutorial, Psychology & Social Relations, Harvard University, Cambridge, MA
Sophomore Tutor
12 undergraduates per semester
20 hours/week for two semesters

Stress and Illness, Psychology & Social Relations, Harvard University, Cambridge, MA
Teaching Fellow

80 undergraduates
5 hours/week for one semester

1982-1983

Sophomore Tutorial, Psychology & Social Relations, Harvard University, Cambridge, MA
Sophomore Tutor
12 undergraduates per semester
20 hours/week for two semesters

Methods in the Social Sciences, Psychology and Social Relations, Harvard University, Cambridge, MA
Teaching Fellow
35 undergraduates
10 hours/week for one semester

1983-1984

Schizophrenia, Psychology and Social Relations, Harvard University, Cambridge, MA
Teaching Fellow
45 undergraduates
10 hours/week for one semester

Other Teaching/Advisory Responsibilities at Harvard University

1981-1983	Resident Tutor and Adviser, Dudley House, Harvard College, Cambridge, MA
	Resident Tutor and Adviser to 80 undergraduate Psychology & Social Relations Majors
1984-	Thesis Advisor, Harvard College, Cambridge, MA
2000-	Member, Board of Honors Tutors, Department of Psychology (Arts and Sciences), Harvard University, Cambridge, MA

Harvard Medical School

1986-2005	Clinical Research Advisor for Post-Doctoral Research Fellows in the Dept. of Psychiatry, VA Boston Healthcare System, Harvard Medical School, Brockton, MA (see section on Supervisory Role for specific students). Mentor on research projects (2 hours per week). Mentor and post-doctoral fellows on their research projects (5-10 hours per week).
1990-2005	Clinical Research Advisor for Visiting Scholars in the Department of Psychiatry, VA Boston Healthcare System, Harvard Medical School, Brockton, MA (see also Supervisory Role for specific students). Mentor visiting scholars on research projects (2 hours/week)
1993-1994	Acting Co-Director, Biological Psychiatry, Clinical Research Training Program, Department of Psychiatry, Harvard Medical School. Responsible for coordinating the Clinical Research Training Program, including the weekly seminar where fellows met weekly for a didactic seminar (2-3 hours per week).
1993-1994	Coordinator, Lecturer, Neuroscience Seminar Series, Residency Training Program, Department of Psychiatry, Harvard Medical School, VAMC-Brockton, MA. Responsible for coordinating a yearlong seminar series on neuroscience (5 hours per week).
1993-1996	Coordinator, Lecturer, Biological Psychiatry, Clinical Research Training Program, Department of Psychiatry, Harvard Medical School. Assisted in coordinating the Clinical Research Training Program seminars and in the administrative aspects of the program (3 hours per week).
1993-	Preceptor, Biological Psychiatry, Clinical Research Training Program, Department of Psychiatry, Harvard Medical School (see section Supervisory Role for specific students). Preceptor on individual research projects for post-doctoral fellows (10-20 hrs. per week).
1996-2007	Associate Director, Clinical Research Training Program, Department of Psychiatry, HMS. Responsible for assisting in coordinating and administrating aspects of the Clinical Research Training Program, including co-directing the weekly seminar (2-3 hours per week).
2008-	Co-Director, and PI, Clinical Research Training Program, Department of Psychiatry, HMS. Responsible for assisting in coordinating and administering aspects of the Clinical Research Training Program, including co-directing the weekly seminar (2-3 hours per week).

VA Boston Healthcare System

2008-2010	Co-Organized the Research Methods PGY-II course as part of the Harvard South Shore Residency Training Program in Psychiatry, VA Boston Healthcare System, Brockton, MA
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2008-2012

Direct monthly seminar for Residency Pathway to Research Training Program, Harvard South Shore Residency Training Program in Psychiatry, VA Boston Healthcare System, Brockton, MA

Advisory and Supervisory Responsibilities:

Dr. Shenton has mentored many talented researchers over the course of her career, including many Professors, Associate Professors, Assistant Professors, Instructors, Senior Scientists, as well as Department Chairs and Deans of Medical Schools.

Preceptorships

1991-1994

Hiroto Hokama, M.D., Ph.D., Research Fellow, Visiting Scholars Program, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School (received the *Neal Mysell Award*, 1994, for most outstanding poster presentation at the *Second Annual Research Day*, Department of Psychiatry, Harvard Medical School). (See Bibliography portion of CV for first author and co-authorship on abstracts, papers, and presentations at professional meetings). (Currently Assistant Professor, Department of Psychiatry, University of Ryukyu, Okinawa).

1994-1995

Hirokazu Ohta, M.D., Ph.D., Research Fellow, Visiting Scholars Program, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School. (See CV for first author and co-authorship on abstracts, papers, and presentations at professional meetings). (Currently Director, Hirayasu Hospital, Okinawa).

1994-1995

Chiara Portas, M.D., Research Fellow, Visiting Scholars Program, Basic and Clinical Neuroscience Divisions Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School. (See Bibliography portion of CV for first authorship and co-authorship on abstracts, papers). (Currently Professor at the London Sleep Clinic and Honorary Fellow at the Institute of Neurology, University of London, London, England.)

1994-2007

Chandlee Dickey, M.D., Research Fellow, and now Assistant Professor, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School, and Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School (*Ethel Dupont Warren Fellowship* 1995-1996; *NARSAD Young Investigator Award* 1995-1997; NIMH Sponsored, *Schizophrenia Young Investigator Award* 1997; *VA Postdoctoral Fellowship in Neuropsychiatry Research/Neurosciences* 1997-2000; *VA Career Development Award* 2000-2003; *VA Advanced Career Development Award* 2003-2006). (Other funding: R21 2008-2010.) (See CV for first author/co-authorship on papers). Currently Residency Training Director, South Shore Residency Training Program in Psychiatry, Harvard Medical School.

1994-1996

Dan Iosifescu, M.D., Research Fellow, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School. (See Bibliography portion of CV for first author and co-authorship on abstracts, papers, and presentations at professional meetings; *Hackett Award*, 2000, for paper written as first author on elastic matching while in the laboratory). Chief Resident in Psychiatry, followed by Instructor and Assistant Professor in the Department of Psychiatry, Massachusetts General Hospital, Harvard Medical School. Also, received a *Kaplen Fellowship on Depression Research Award* in 2000 from the Department of Psychiatry, Harvard Medical School, a *Livingston Fellowship Research Award* in 2001 from the Department of Psychiatry Harvard Medical School, an *America Psychiatric Association Young Investigator Travel Award* in 2001, a *Clinical Investigator Training Program Fellowship* at the Harvard/MIT

Health Sciences and Technology (HST), in collaboration with Pfizer, Inc., in 2001, a NARSAD (National Alliance for Research in Schizophrenia and Depression) in 2001-2002, a *New Investigator Award* from NCEU (New Clinical Drug Evaluation Unit, National Institute of Mental Health) in 2002, a *K23 Award* from NIMH from 2003-2008, PI of a project that is part of a U54 grant to Drs. Keohane and Glaser in 2007-2009, R01 funding from NIH from 2008-2013, listed as *Best Doctors in America* (Psychiatry Section: Mood and Anxiety Disorders, for 2005-2006, listed in the Best Doctors in Boston (Psychiatry) in Boston Magazine in 2006, a *Sidney R. Baer Jr. Foundation Young Investigator Award from NARSAD* (National Alliance for Research on Schizophrenia and Depression) 2006-2008, listed in *Best Doctors in America* (Psychiatry Section: Mood and Anxiety Disorders) 2007-2008, and listed in *Best Doctors in Boston* (Psychiatry) in Boston Magazine, 2008. He is currently Associate Professor of Psychiatry and Neuroscience and Director of the Mood and Anxiety Disorders Program at Ichon School of Medicine at Mount Sinai.

- 1994-1998 Geoff Potts, Ph.D., Research Fellow, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry a VAMC-Brockton, Harvard Medical School (*Peter B. Livingston Fellowship* 1996-1997; *NARSAD Young Investigator Award* 1998-2000). (See also Bibliography portion of CV for first and co-authorship on abstracts, papers, and presentations). (Currently, Assistant Professor of Psychology, Rice University, Texas, and now Assistant Professor of Psychology, Florida State University.)
- 1995-1996 Hajime Arakaki, M.D., Visiting Instructor, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School. (See Bibliography portion of CV for first author and co-authorship on abstracts, papers and presentations at professional meetings.) (Currently President of Arakaki Hospital, Okinawa.)
- 1995-1997
(see also 2004-2005) Paola Mazzoni, Medical Student from the University of Chicago taking a leave of absence to conduct clinical research studies in the Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School. (See bibliography portion of CV for co-authorship on abstracts and presentations at professional meetings). (Resident in Psychiatry at Massachusetts General Hospital, Harvard Medical School, Boston, MA, and completed residency training at Duke University School of Medicine, Durham, NC, completed a fellowship in Child Psychiatry at the Columbia University College of Physicians and Surgeons and is now on staff at Cornell Medical School as a research fellow and staff psychiatrist.)
- 1995-1998 Jun Soo Kwon, M.D., Ph.D., Visiting Assistant Professor, Visiting Scholars Program, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School. (See Bibliography portion of CV for first author and co-authorship on abstracts and presentations at professional meetings). (Assistant Professor, and Associate Professor, and now Professor and Chair, Department of Psychiatry, National University College of Medicine, Seoul, South Korea, where he has received the *Paul Janssen Schizophrenia Award* from the Korean Neuropsychiatric Association, October, 2000, for his work in schizophrenia. *The Wunsch Medical Award*, 2009, the most honorable award from the Korean Academy of Medical Sciences, Seoul National University, Seoul, South Korea).
- 1995-1999 Yoshio Hirayasu, M.D., Ph.D., Visiting Assistant Professor, Visiting Scholars Program, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School. (See Bibliography portion of CV for first author & co-authorship on abstracts, papers, and presentations at professional meetings). (Currently Professor and Chairman, Department of Psychiatry, Yokohama City University School of

Medicine, Yokohama, Japan, and, as of April 1, 2010, also now President of Yokohama City University Hospital Medical Center, and Dean of the Graduate School of Medicine, Yokohama City University Graduate School of Medicine, Yokohama, Japan.)

- 1996-2000 Jane Anderson, Ph.D., NIMH Post-Doctoral Research Fellow, Clinical Research Training Program in Biological Psychiatry, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School (1996-1997; *Peter Livingston Fellowship Award* 1997-1998; *NIMH Individual Postdoctoral National Research Service Award* 1997-1998; 1999-2000). (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations at professional meetings). (Currently at home raising her son.)
- 1997-2004 Melissa Frumin, M.D., Post-Doctoral Research Fellow, and then Instructor, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School (*Ethel Dupont-Warren Fellowship* 1997-1998; *VA Postdoctoral Fellowship in Neuropsychiatry Research/Neurosciences* 1998-2001; *NARSAD Young Investigator Award* 1999-2001; *VA Career Development Award* 2002-2005). (See Bibliography portion of CV for first author and co-authorship on papers, abstracts, and presentations at professional meetings). (Currently Instructor, Department of Psychiatry, BI-Deaconess and Massachusetts Mental Health Center, Harvard Medical School.)
- 1998-1999 Shin Tanaka, M.D., Research Fellow, Visiting Scholars Program, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School (see CV for first and co-authorship on abstracts, papers, and presentations at professional meetings). (Currently, Instructor, Department of Psychiatry, University of Ryukyu, Okinawa.)
- 1999-2001 Almos Nagy, M.D., Research Fellow, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School. (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations at professional meetings). (Resident in Psychiatry at the South Shore Residency Training Program, Department of Psychiatry, Harvard Medical School.)
- 1999-2001 Khang Uk Lee, M.D., Ph.D., Visiting Assistant Professor, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School (supported through funds from The Catholic University of Korea, and from NIMH funds). (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations at professional meetings). (Associate Professor of Psychiatry, The Catholic University Medical College, Seoul, Korea and currently Professor and Director, Department of Psychiatry, Kangwon National University School of Medicine, Gangwon Provincial Mental Health Center, Director, Gangwon Suicide Prevention Center, Chief Medical Officer, Kangwon National University Hospital, Gangwon-do, Republic of Korea.)
- 1999- Marek R. Kubicki, M.D., Ph.D., Visiting Assistant Professor, and then Assistant Professor, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School and Assistant Professor, and now Associate Professor, Departments of Psychiatry and Radiology, Psychiatry Neuroimaging Laboratory, Brigham and Women's Hospital, Harvard Medical School, Boston, MA (has been supported by a fellowship from the Kosciuszko Foundation, Poland, and from NIMH funds; received the *Neal Mysell Award*, 2000, for most outstanding poster presentation at the *Eighth Annual Research Day*, Department of Psychiatry, Harvard Medical School; *NARSAD Young Investigator Award* 2001-2003 and 2003-2005; *11th*

Biennial Winter Workshop in Schizophrenia, Young Investigator Award, Davos, Switzerland, 2002; NIMH Schizophrenia Young Investigator Award 2003; ACNP Young Investigator Travel Award, 2004; William F. Milton Fund Award for Scientific Research, Harvard University, 2005).(See Bibliography of CV for first author and co-authorship on papers, abstracts and presentations at professional meetings, and two R01s from NIMH).

- 2000-2001 Jay Nierenberg, M.D., Ph.D., Longwood Residency Training Program, PYG-IV, Department of Psychiatry, Harvard Medical School, and Research Fellow, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School (*Ethel Dupont-Warren Fellowship 2000-2001; NIMH Young Investigator Award 2003*). (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations at professional meetings.) (Currently a Senior Researcher at the Nathan Kline Institute, Orangeburg, NY.)
- 2000-2002 Kiyoto Kasai, M.D., Ph.D., Visiting Instructor, Visiting Scholars Program, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School (supported through funds from the University of Tokyo, Japan and then by NIH funds). (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations at professional meetings.) (Currently Professor and Head, Department of Neuropsychiatry, University of Tokyo. Youngest Professor in Japan.)
- 2000-2003 Toshiaki Onitsuka, M.D., Ph.D., Visiting Instructor, Visiting Scholars Program, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School (supported through funds from Kyushu University Medical School, Fukuoka, Japan, and then by NIH funds). (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations at professional meetings.) (Currently staff member at Fukuoka Prefectural Dazaifu Hospital Psychiatric Clinic and Assistant Professor and Director, Psychiatry Neurophysiology Laboratory, Department of Neuropsychiatry, Graduate School of Medical Sciences, Kyushu University and Kyushu Hospital, Fukuoka, Japan.)
- 2000- Kevin Spencer, Ph.D., Research Fellow in the Clinical Research Training Program in Biological Psychiatry, then Instructor, Assistant Professor, and now Associate Professor, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Boston VA Healthcare System, and Harvard Medical School (*Peter B. Livingston Award 2000-2001; National Research Service Award NIMH 2001-2002; NARSAD Young Investigator Award 2002-2004; Neal Mysell Award, 2002*, for most outstanding poster presentation at the *Tenth Annual Research Day*, Department of Psychiatry, Harvard Medical School; *NARSAD Young Investigator Award 2004-2006; 13th Biennial Winter Workshop in Schizophrenia, Senior Investigator Award*, Davos, Switzerland, 2006; R01 funding from NIMH 2008-2013). (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations.)
- 2001-2004 Hae Jeong Park, Ph.D., Visiting Research Fellow, Visiting Scholars Program, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Boston VA Healthcare System, Brockton Division, and Harvard Medical School (supported in part from the Seoul National University, South Korea for year one, and in part from grants from NIH). (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations). (Associate Professor and now Professor, Department of Nuclear Medicine, Department of Radiology and Psychiatry, Yonsei University College of Medicine, Seoul, Korea, and Adjunct Professor, Department of Psychiatry, and Adjunct Professor, Biomedical Science & Engineering major of the graduate school at Yonsei University and the Brain Korea 21 Project for Medical Science, and Professor of the Serverance Biomedical Science Institute, Yonsei University College of Medicine, South Korea.)

- 2001-2005 Xiangyang Li, M.D., Ph.D., Research Fellow in the Clinical Research Training Program in Biological Psychiatry, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Boston VA Healthcare System, and Harvard Medical School (*VA Postdoctoral Fellowship in Neuropsychiatry Research/Neurosciences 2002-2005.*) (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations at professional meetings.)
- 2002-2003 Na Young Ji, M.D., Research Associate, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Boston Healthcare System, and Harvard Medical School. Working part-time evaluating brain structures in schizotypal personality disorder prior to entering residency training in psychiatry (supported in part from funds from the Stanley Medical Research Institute Senior Scholars Program). (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations at professional meetings.) (Completed Residency Training in Psychiatry at the University of North Carolina, Chapel Hill, NC -2003-2008, and entered Child Fellowship program in Psychiatry. Now Assistant Professor, Kennedy Krieger Institute, Baltimore, MD.)
- 2002-2003 Anders Brun, M.S., Research Associate, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Boston Healthcare System, and Harvard Medical School. Working on fiber tracking using diffusion tensor images (supported from a grant from NIH). (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations). (Completed his Ph.D. in Medical Imaging in the Department of Biomedical Engineering, Linköping University, Linköping, Sweden. Now Assistant Professor in Image Analysis, Center for Image Analysis, Swedish University of Agricultural Sciences, Uppsala University, Uppsala, Sweden.)
- 2002-2004 Noriomi Kuroki, M.D., Visiting Research Fellow, Visiting Scholars Program, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, VA Boston Healthcare System, and Harvard Medical School (supported in part by The Japanese Society for the Promotion of Science and Scholarship for Studying Abroad, the Welfide Medicinal Research Foundation, and from NIH grant support). *Neal Mysell Award*, 2004, for most outstanding poster presentation at the *Twelfth Annual Research Day*, Department of Psychiatry, Harvard Medical School. (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations). (Currently Instructor, Department of Neuropsychiatry, University of Tokyo Hospital, Tokyo, Japan.)
- 2002-2005 Flavia May, B.A., Volunteer, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Boston Healthcare System, and Harvard Medical School. (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations)
- 2003-2003 Brenda Bemporad, Ph.D., Volunteer, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, VA Boston Healthcare System, Harvard Medical School.
- 2003-2005 Min-Seong Koo, M.D., Ph.D., Visiting Research Fellow, Visiting Scholars Program, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Boston VA Healthcare System, and Harvard Medical School, visiting from College of Medicine, Kwandong University, Gangnung City, Korea. (Supported from NIH funds.) (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations.) (Currently Dean, Catholic Kwandong University School of Medicine,

Professor and Chairperson, Department of Psychiatry, Catholic Kwandong University College of Medicine, and Chair and Director of Myung-Ji Hospital, Gangnung City, Korea.)

- 2003-2007 Motoaki Nakamura, M.D., Visiting Research Fellow, Visiting Scholars Program, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Boston VA Healthcare System, and Harvard Medical School, and Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School. *International Congress of Schizophrenia Research Young Investigator Award*, 2005. *Neal Mysell Award*, 2005, for most outstanding poster presentation at the *Thirteenth Annual Research Day*, Department of Psychiatry, Harvard Medical School. *13th Biennial Winter Workshop in Schizophrenia, Young Investigator Award*, Davos, Switzerland, 2006. (Supported in part from a scholarship for studying abroad through the Mitsubishi Pharma Research Foundation, Japan, and supported in part by NIH funds.) (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations.) (Currently Visiting Researcher, Department of Psychiatry, Yokohama City University School of Medicine, Yokohama, Japan.)
- 2003- Sylvain Bouix, Ph.D., Postdoctoral Research Fellow (2003-2005), Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Boston VA Healthcare System, and Harvard Medical School. Instructor (2005-2008), Instructor (2005-2008), and Assistant Professor (2008-present), Psychiatry Neuroimaging Laboratory, Department of Psychiatry Brigham and Women's Hospital, Harvard Medical School, Boston, MA. (Center for Integration of Medicine and Innovative Technology-CIMIT-Solider in Medicine Award and R01 funding from NIMH from 2009 to 2014.) (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations.)
- 2004-2005 Takeshi Yoshida, M.D., Visiting Research Fellow, Visiting Scholars Program, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Boston VA Healthcare System, and Harvard Medical School, visiting from National Defense Medical School, Saitama, Japan. (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations). (Currently Visiting Researcher, Department of Psychiatry, Yokohama City University School of Medicine, Yokohama, Japan.)
- 2004-2006 KangUk Lee, M.D., Ph.D., Visiting Research Fellow, Visiting Scholars Program, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Boston VA Healthcare System, and Harvard Medical School, and Psychiatry Neuroimaging Laboratory, Brigham and Women's Hospital, Harvard Medical School. Visiting from Seoul National University College of Medicine, Seoul, South Korea. (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations.) (Currently Associate Dean of Graduate Education and Research, Professor, and Head, Department of Psychiatry, Kangwon National University College of Medicine, Chunchon, South Korea.)
- 2004-2005 Paola Mazzoni, M.D., Research Fellow, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Boston VA Healthcare System, and Harvard Medical School. Completed her residency training in psychiatry at Duke University Medical School. (Currently a child fellow in Psychiatry at Columbia College of Physicians and Surgeons.
- 2005-2007 Marc Niethammer, Ph.D., Post-Doctoral Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, and Harvard Medical School. (See Bibliography portion of CV for first author and co-authorship on

papers, abstracts and presentations.) (Assistant Professor and now tenured Associate Professor, Department of Computer Science, University of North Carolina.)

- 2005-2008 Toshiro Kawashima, M.D., Ph.D., Visiting Research Fellow, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Boston VA Healthcare System, and Psychiatry Neuroimaging Laboratory, Brigham and Women's Hospital, Harvard Medical School, visiting from Kyushu University, Fukuoka, Japan. (Currently, Staff psychiatrist at Fukuoka Prefectural Psychiatric Center Dazaifu Hospital and Associate Professor in the Department of Psychiatry, Saga Medical School, Kyushu University, Fukuoka, Japan.)
- 2006-2008 Katharina Quintus, M.S., Research Associate, Psychiatry Neuroimaging Laboratory, Brigham and Women's Hospital, Harvard Medical School.
- 2006- Jennifer Fitzsimmons, M.D., Post-Doctoral Research Fellow, and now Instructor (2009), Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, and Harvard Medical School.
- 2006- Zora Kikinis, M.D., Post-Doctoral Research Fellow and now Instructor (2009), Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, and Harvard Medical School. (*2006-2009 Reentry to Biomedical Research, supplement to NIMH R01 Computerized Image Processing Analyses in Schizophrenia; NARSAD Young Investigator Award, 2008-2010. Harvard Catalyst Clinical Research Center Junior Investigator Laboratory Support Award (2011.)*)
- 2006-2007 Bumseok Jeong, M.D., Ph.D., Visiting Research Fellow, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Boston VA Healthcare System, Harvard Medical School and Psychiatry Neuroimaging Laboratory, Psychiatry Department, Brigham and Women's Hospital; visiting from Seoul National University, Seoul, South Korea. Moved to Eulji University, South Korea and then to the Korean Advanced Institute of Science and Technology, Graduate School of Medical Science & Engineering, Department of Psychiatry, KAIST Clinic, Daejeon, Republic of Korea, where he is Associate Professor.
- 2006-2007 Gudrun Rosenberger, M.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, and Harvard Medical School. Visiting from the Department of Psychiatry, Medical University of Innsbrook, Innsbrook, Austria. (Currently Psychiatrist, Department of Psychiatry, Medical University of Innsbrook, Innsbrook, Austria.)
- 2007-2008 Jungsu Oh, Ph.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, and Harvard Medical School. Visiting from Department of Nuclear Medicine, Seoul National University College of Medicine, Seoul, South Korea (Currently, Assistant Professor, Department of Psychiatry, Seoul National University College of Medicine, Seoul, South Korea.)
- 2007- Yogesh Rathi, Ph.D., Post-Doctoral Research Fellow (2007-2008), Instructor (2008), and Assistant Professor (2009), Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, and Harvard Medical School (*Information System and Research Council grant award; "Diffusion Modeling and Fiber Cup Award" for the best tractography algorithm competition held during MICCAI – Medical Image Computing and Computer Assisted Intervention Conference, 2009. October 2012: New and Notables: The NIMH has cited Dr. Rathi's R01 recently funded research among new investigators. This project will use new computational and acquisition approaches in order to shorten the time needed for conducting advanced diffusion imaging. 2013:*

selected to participate in the course for *HMS Leadership Development for Physicians and Scientists*.

- 2007-2008 Lucas Torres, M.D., Post-Doctoral Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, and Harvard Medical School.
- 2007-2007 Aristotle Voineskos, M.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, and Harvard Medical School. Visiting from Toronto University School of Medicine, Toronto, CA, where he was in his 4th year resident in Psychiatry. He completed his 5th year residency training in 2008 and in 2007 he received the *American Association of Geriatric Psychiatry Stepping Stone Award*, the *Society of Biological Psychiatry Travel Scholarship*, a *Robin Hunter Memorial Award for Best Resident Research Project at the Department of Psychiatry*, University of Toronto, the *Best Resident in Geriatric Psychiatry Award in the Department of Psychiatry*, University of Toronto, and the *World Congress of Psychiatric Genetics Travel Scholarship*. In addition, in 2008 he was selected for *Research Colloquium for Junior Investigators (American Psychiatric Association)*, the *Best Presentation by a Resident - 34th Annual Harvey Stancer Research Day*, University of Toronto, and he received a *Canadian Institutes of Health Research (CIHR-2008-2011) Clinical Scientist Award* (Phase I) for a project entitled "Identifying Genetic Vulnerabilities that Mediate Differences in Connectivity in Schizophrenia Across the Adult Lifespan: A Diffusion Tensor Imaging and Genetics Study". *APIRE/AstraZeneca Young Minds in Psychiatry Award*, the *American Psychiatric Association*, 2009. (Completing residency training in Psychiatry, Toronto University School of Medicine, Toronto, Canada, was Instructor in the Department of Psychiatry, Toronto University School of Medicine, and is now Assistant Professor in the Department of Psychiatry, Institute of Medicine, University of Toronto, and Koerner New Scientist and Head of the Kimel Family Translational Imaging-Genetic Laboratory.)
- 2007-2010 William Burch, M.D., Ph.D., Staff Psychiatrist and Instructor, Department of Psychiatry, VA Boston Healthcare System, Brockton, MA (2007-2009) and then Staff Psychiatrist, Department of Psychiatry, VA Bedford Healthcare System, and Instructor, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, and Harvard Medical School.
- 2008-2011 Takeshi Asami, M.D., Ph.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, and the Clinical Neuroscience Division, Laboratory of Neuroscience, VA Boston Healthcare System, and Department of Psychiatry, Harvard Medical School. Funded from the Department of Psychiatry, Yokohama City University School of Medicine, Yokohama, Japan. Currently Assistant Professor, Department of Psychiatry, Yokohama University School of Medicine.
- 2008-2012 Jason Schneiderman, Ph.D., Post-Doctoral Research Fellow, Clinical Research Training Program in Biological Psychiatry, and Post-Doctoral Research Fellow, Department of Psychiatry, Harvard Medical School, and member of the Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School (see CV for publications). *International Congress of Schizophrenia Research Young Investigator Award*, 2009.
- 2008-2008 Francisco Romo-Nava, M.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School. Visiting and funded from the National Institute of Psychiatry, Mexico City, Mexico. Currently, staff physician, National Institute of Psychiatry, Mexico City,

Mexico. 1st place for poster at the poster session, *XXI National Meeting of the Mexican Psychiatric Association*, Acapulco, Mexico, November 13-20th, 2009.

- 2008-2009 Julien Von Siebenthal, Ph.D., Post-Doctoral Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School (see CV for publications). Currently, Post-Doctoral Research Fellow, Children's Hospital, Boston, MA.
- 2008-2010 Sun Woo Lee, M.D., Visiting Associate Professor, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, and Harvard Medical School. Visiting from the Department of Psychiatry, Chungnam National University Hospital, Chungnam National University College of Medicine, Gung-gu, Daejeon, South Korea. Funded from Chungnam National University Hospital, Chungnam National University College of Medicine, Gung-gu Daejeon South Korea.
- 2008-2011 An Nguyen, M.D., Resident in Psychiatry, South Shore Residency Training Program, VA Boston Healthcare System, Brockton, and Harvard Medical School, Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, and now Clinical Fellow in Psychiatry, Children's Hospital, Harvard Medical School. (Mysell Best Poster Finalist, 2009). (See also CV for publications.) Currently, Adolescent and Child Psychiatrist in San Jose, CA.
- 2008-2010 Thomas Whitford, Ph.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, and Harvard Medical School. Visiting from University of Sydney, Sydney, Australia. Funded from a National Health and Medical Research Council Australian Government (NHMRC) Training Fellowship (Honorable mention, SIRS Contest Winning Essay, 2nd *Schizophrenia International Research Society Conference*). (Recipient a NARSAD Young Investigator Award 2010-2012.) (See also CV for publications).
- 2008- Peter Savadjiev, Ph.D., Post-doctoral Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School. Recipient of the 2009 *MICCAI Young Scientist Award* for the best paper: <http://ubimon.doc.ic.ac.uk/MICCAI09/m773.html>. Also recipient of a NARSAD Young Investigator Award (2015-2017), a prestigious award granted from the [Brain and Behavior Research Foundation](#) (See also CV for publications.)
- 2008- Alexander Lin, Ph.D., Instructor and now Assistant Professor of Radiology, Center for Clinical Spectroscopy, and Psychiatry Neuroimaging Laboratory, Brigham and Women's Hospital, Harvard Medical School. Recipient of the BWH Biomedical Research Institute Clinical Research Excellence Award (2011), and the Harvard Medical School Young Mentor Award (2014). He has also been supported by a Department of Defense Congressionally Directed Medical Research Program award, and is part of an NIA study of Chronic Traumatic Encephalopathy as well as a Department of Defense Psychological health and Traumatic Brain Injury Research Program award for investigating Tau Imaging of Chronic Traumatic Encephalopathy. He has also completed an Innovations Award from the Center for Integration of Medicine and Innovative Technology (CIMIT) as well as completing a project funded by Siemens. He was funded by Draper Laboratory for a University Research and Development Grant and he received a Harvard Catalyst Pilot Grant Award entitled "Noninvasive Cerebral Glutamate Monitoring in Veterans with Traumatic Brain Injury."
- 2008-2011 Toshiyuki Ohtani, M.D., Ph.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, and the Clinical Neuroscience Division, Laboratory of Neuroscience,

VA Boston Healthcare System, and Department of Psychiatry, Harvard Medical School. Funded from Department of Neuropsychiatry, Kyushu University, Maidashi, Higashiku, Fukuoka, Japan. Finalist, Top Poster Award *Society for Biological Psychiatry*, 2010, New Orleans, LA. Currently Associate Professor, Safety and Health Organization, Chiba University, Inage-ku, Chiba, Japan.

- 2009- Hesham Hamoda, M.D., Clinical Fellow in Psychiatry, Children's Hospital, Harvard Medical School, and Fellow, Psychiatry Neuroimaging Laboratory, Brigham and Women's Hospital, Harvard Medical School. Recipient of a *Dupont-Warren Fellowship*, Harvard Medical School, and a *Livingston Fellowship Award*, Harvard Medical School. Recipient of an *American Psychiatric Association Junior Investigator Award* (2011). Vice-President for the International Association for Child and Adolescent Psychiatry and Allied Professions (IACAPAP)
- 2009-2009 (see also 2011-present) Inga Koerte, M.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School. Funded from Ludwig-Maximilian-University, Munich, Germany and by the Robert Bosch Foundation - stipend for fast-track program for excellence and leadership skills for outstanding women in science, 20 stipends given in the entire country. (See CV for publications; currently completing her residency training in neuroradiology.)
- 2009-2014 Taiga Hosokawa, M.D., Ph.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, and the Clinical Neuroscience Division, Laboratory of Neuroscience, VA Boston Healthcare System, and the Department of Psychiatry, Harvard Medical School. Funded from the Department of Psychiatry, University of Tokyo, Tokyo, Japan. (See CV for publications; currently Vice President Tsuchida Hospital, Affiliated Hospital of Tokyo University, Tokyo, Japan.)
- 2009-2011 Toshiaki Onitsuka, M.D., Ph.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, and the Clinical Neuroscience Division, Laboratory of Neuroscience, VA Boston Healthcare System, and Department of Psychiatry, Harvard Medical School. Funded from the Department of Psychiatry, Yokohama City University School of Medicine, Yokohama, Japan. Currently Assistant Professor in the Department of Neuropsychiatry, Kyushu University and Kyushu University Hospital, Fukuoka, Japan.
- 2009-2010 Hsiao Piau Ng, Ph.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School. Funded from the Agency for Science, Technology and Research (A*STAR), Singapore Bio-imaging Consortium, Singapore. Recipient of an *NIMH Young Investigator Travel Award* to attend the *2nd Schizophrenia Scientific Conference Sponsored by the Schizophrenia International Research Society* (2010), one of top 3 finalists for A*STAR investigatorship (SERC), October, 2010.
- 2009-2011 Sang-Hyuk Lee, M.D., Ph.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, and the Clinical Neuroscience Division, Laboratory of Neuroscience, VA Boston Healthcare System, and Department of Psychiatry, Harvard Medical School. Funded from CHA University School of Medicine, Seoul, South Korea. (Currently Associate Professor and Department Chairperson, Department of Psychiatry, Bundang CHA Medical Center, CHA University School of Medicine, and Director of Clinical Trials in CHA Bundang Medical Center, Yatap, Bundang, Seongnam, Kyounggi, Republic of Korea.)

2009-2011

Yukiko Saito, M.D., Ph.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School. Funded from Kansai Medical University, Suita, Osaka, Japan. Currently Assistant Professor of Neuropsychiatry, Kansai Medical University, Osaka, Japan.

2009-

Ofer Pasternak, Ph.D., Post-doctoral Research Fellow, and now Instructor, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School. Funded through a *Fulbright Scholarship* and through grant funds to Drs. Shenton and Westin. *NARSAD Young Investigator Award*, 2013-2015.

2009-2011

Po Chang Hsu, Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, and Master's degree candidate, Neurobiology, Harvard Extension Division, Harvard University.

2010-2013

Demien Wasserman, Ph.D., Post-doctoral Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, and Laboratory of Mathematical Imaging, and Surgical Planning Laboratory, Department of Radiology, Brigham and Women's Hospital, Harvard Medical School.

2010-2011

Marlene Wigand, Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, Boston, MA. Medical student from the University of Munich, Germany. Funded through a scholarship awarded to only the top 1% of students, the studienstiftung des deutschen volkes.

2010-2011

Christian Clemm, Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, Boston, MA. Medical Student from the University of Munich, Germany. Funded through a scholarship awarded to only the top 1% of students, the studienstiftung des deutschen volkes.

2010-2011

Karl Egger, M.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, MA. Funded from the University of Innsbruck School of Medicine, Innsbruck, Austria.

2010-2012

Meina Quan, M.D., Ph.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, and Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, VA Boston Healthcare System, Brockton, MA and Harvard Medical School. From Nankai University School of Medicine, Tianjin, The People's Republic of China. Dr. Quan's abstract submitted for *The Society of Biological Psychiatry* (SOBP), with the title "Abnormalities of White Matter Tracts between Rostral Middle Frontal Gyrus / Inferior Frontal Gyrus and Striatum in First-Episode Schizophrenia", was selected as one of 47 out of over 600 abstracts, to be considered for the Top Poster Award (2011). Recipient of *Outstanding Ph.D. Graduate* Nankai University, The People's Republic of China. Recipient of a Livingston Award (2012). Recipient of a Travel Award in 2012, one of 36 selected from 240 applicants, to participate in the *3rd Biennial Schizophrenia Research Conference* to be held in Florence, Italy, and sponsored by the *Schizophrenia International Research Society* (SIRS).

2010-2012

Tomohide Roppongi, M.D., Ph.D., Visiting Research Fellow, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, VA Boston Healthcare System, Brockton, MA and Harvard Medical School and Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital,

Harvard Medical School, Boston, MA. Funded from Hirosaki University School of Medicine, Hirosaki, Japan.

- 2011-2012 Yingying Tang, Ph.D., Visiting Research Fellow, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, Boston, MA. Visiting from Department of Biomedical Engineering Shanghai Jio Tong University, Shanghai, China.
- 2011-2012 Calegero Montedoro, medical and Ph.D. school candidate, Université Catholique de Louvain School of Medicine, Louvain-la-Neuve, Belgium.
- 2011- Inga Koerte, M.D. Visiting Lecturer and Senior Research Associate in the Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, from Ludwig-Maximillian-University, Munich, Germany. LMU Förderung für Forschung und Lehre, *LMU Munich grant for Young Investigators* (2009-2011); *Robert-Bosch-Foundation, Germany*, stipend for 2-year *FAST TRACK Program for Excellence and Leadership Skills for Outstanding Women in Science* (2011-present); *Deutsche Gesellschaft für Neuroradiologie, Germany*, *Marc-Dünzl-Prize, Young Investigator Award* (2011); *Deutscher Akademie Scher Austaushdierst, Germany*, *Scholarship for 6-month Research Fellowship* (2011-2012); *Else-Kröner-Fresenius-Stiftung, Germany*, 2-year *Research Fellowship*, 1 out of 3 stipends of the *Else-Kröner Memorial Award* (2012-present). Professor of Neurobiological Research, Child and Adolescent Psychiatry, Ludwig-Maximillian-University of Munich, Munich German (2014).
- 2011- Julie Stamm, Pre-Doctoral Student, Boston University School of Medicine, Anatomy and Neurobiology Ph.D. Program. (*F31 Ruth L. Kirschstein National Research Service Award for Individual Pre-Doctoral Students*; F31NS 081957 “Frontal Lobe Neuroimaging as a Biomarker of Chronic Traumatic Encephalopathy”).
- 2011- Noah Philips, M.D., Assistant Professor of Psychiatry and Human Behavior (Clinical), Brown University and Providence VAMC. Received a *VA Career Development Award* (2013-2018) entitled “PTSD and the Default Network: Developing Imaging Phenotypes”, with Dr. Shenton as a Co-Mentor.
- 2011- Kaloyan Taney, M.D., Assistant Psychiatrist in Psychiatry, Massachusetts General Hospital, and Instructor, Harvard Medical School. Received a K23 MH097844 entitled “Cognitive Processing Therapy for PTSD with Co-Morbid Mild Traumatic Brain Injury” (2013-2018), with Drs. Shenton and Roger Pitman as Co-Mentors.
- 2012-2012 Fan Zhang, Ph.D., Professor in Computer Science and Engineering, Henana University, China, Visiting Professor, Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, Boston MA, for 6 months to learn image processing pipeline for diffusion tensor imaging and to assist in algorithm development with other computer scientists.
- 2012-2013 William Panenka M.D., M.Sc., FRCPS (Neurology and Psychiatry), Visiting Post-doctoral Research Fellow in the Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Harvard Medical School, Boston, MA. He is a Neurologist from the University of British Columbia, Vancouver, British Columbia, Canada, who began focusing in 2011 on MRI imaging correlates of addiction and disease in a cohort of socially disadvantaged, largely drug addicted individuals in Vancouver. He was in the PNL to learn more about traumatic brain injury (TBI) and more sophisticated MRI techniques that are useful in understanding TBI. Currently Assistant Professor, University of British Columbia, Canada, Member British Columbia Provincial Neuropsychiatry Program.

- 2013-2013 Elif Gürdenz. Observership in the Psychiatry Neuroimaging Laboratory, Department of Psychiatry and Department of Radiology, Brigham and Women's Hospital, Harvard Medical School. Fifth year medical student at Istanbul University, Cerrahpaşa Medical Faculty, Istanbul, Turkey.
- 2013-2013 Ünsal Aydinoğlu, M.D. Observership in the Psychiatry Neuroimaging Laboratory, Department of Psychiatry and Department of Radiology, Brigham and Women's Hospital, Harvard Medical School. Psychiatry Resident at Atatürk University, Faculty of Medicine, Department of Psychiatry, Erzurum, Turkey.
- 2013-2013 Pedro Rosa, M.D. Observership in the Psychiatry Neuroimaging Laboratory, Department of Psychiatry and Department of Radiology, Brigham and Women's Hospital, Harvard Medical School. Psychiatry Residency (2011-2014), Institute of Psychiatry at the University of São Paulo Medical School, São Paulo, Brazil.
- 2013-2013 Katharine Innsbrinker, M.D. Observership in the Psychiatry Neuroimaging Laboratory, Department of Psychiatry and Department of Radiology, Brigham and Women's Hospital, Harvard Medical School. Fifth year resident in Psychiatry, University of Gethenborg, Gethenborg, Sweden.
- 2013-2014 Takeshi Sasaki, M.D. Visiting Post-doctoral Research Fellow in the Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School, Boston, MA. He received his training from the Tokyo Medical and Dental School (TMDU), and is sponsored by the TMDU-HMS exchange program entitled "the Strategic Young Researcher Overseas Visits Program for Accelerating Brain Circulation" sponsored by the *Japan Society for the Promotion of Science*. Dr. Shenton was selected as one of eight professors at HMS to be a part of this program as a mentor. Dr. Sasaki has a background in PET imaging and at the PNL he will pursue his interest in diffusion MRI.
- 2013-2014 Ahmed Adel Fouad Eid, Observership in the Psychiatry Neuroimaging Laboratory, Department of Psychiatry and Department of Radiology, Brigham and Women's Hospital, Harvard Medical School. Last year in medical school, Faculty of Medicine Alexandria University, Alexandria, Egypt.
- 2013- Beth Ripley, M.D., Ph.D. Research Fellow in the Psychiatry Neuroimaging Laboratory, Departments of Psychiatry and Department of Radiology, Brigham and Women's Hospital, Harvard Medical School. Chief Resident in Radiology, Brigham and Women's Hospital, Harvard Medical School.
- 2013- Ahmed Maklouf, M.D. Observership in the Psychiatry Neuroimaging Laboratory, Departments of Psychiatry and Department of Radiology, Brigham and Women's Hospital, Harvard Medical School (graduate from Ain Shams Medical school in Cairo, Egypt).
- 2014- Marc Muehlmann, M.D. Post-doctoral Research Fellow in the Psychiatry Neuroimaging Laboratory, Departments of Psychiatry and Radiology, Brigham and Women's Hospital, Harvard Medical School. Received his M.D. from Ludwig-Maximillian University, Munich, Germany, in 2014.

Thesis Supervision of Graduate Students

- 2012- Julie Stamm, Graduate Student in the Anatomy and Neurobiology Ph.D. Program, Boston University Medical School, Thesis "The effects of age of first exposure to

repeated head impacts through tackle football on later-life white matter structural integrity on neurobehavioral function".

2013-2014

Talis M. Swisher, A.B. Masters of Science in Biomedical Sciences student at Tufts University School of Medicine, Public Health & Professional Programs. Reader for thesis entitled: "White Matter Integrity of the Cingulum Bundle in Healthy Aging".

Thesis Supervision of Undergraduates

1991-1992

I-han Chou, Class of 1992, Department of Psychology, Harvard College. Senior Honors Thesis: "A magnetic resonance imaging study of the cingulate gyrus in schizophrenia". This Summa cum laude thesis was awarded the Thomas Temple Hoopes Prize for Excellence in the Work of an Undergraduate and Faculty Member. (Received, a Ph.D. in the Cognitive Neuroscience Program at the Massachusetts Institute of Technology). (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations).

1994-1995

Robert Donnino, Class of 1995, Department of Psychology, Harvard College. Senior Honors Thesis: "The parietal lobes and schizophrenia: A quantitative magnetic resonance imaging study." This thesis was awarded *Magna cum laude*. This paper was published in the *American Journal of Psychiatry* (1999) with Rob as second author. (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations). (Currently, graduated from Medical School at SUNY-Stony Brook, completed residency training in internal medicine at SUNY-Stony Brook, and is practicing medicine in New York).

1997-1998

Janos Zahajsky, Class of 1998, Cognitive Neuroscience Major (Departments of Psychology and Biology), Harvard College. Senior Honors Thesis: "An Analysis of Volumetric Differences Between the Fornices of Schizophrenic and Normal Subjects Using MRI Imaging and Specialized Image Processing Software." This thesis was awarded *Magna cum laude*. This work was published in *Schizophrenia Research* (2001) where Janos was first author. (As a medical school at Mount Sinai, he received a *Howard Hughes Medical Institute and the National Institute of Health Research Scholars Program Fellowship* to conduct biomedical research at NIH 2000-2001. He then completed medical school at Mount Sinai, and his residency training in the Psychiatry Residency Training Program at Massachusetts General Hospital, Harvard Medical School. Currently he is staff psychiatrist at UCSF). (See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations).

2001-2002

Laura Wiegand, Class of 2002, Cognitive Neuroscience Major (Departments of Psychology and Biology), Harvard College. Senior Honors Thesis: "Prefrontal Cortical Thickness Abnormalities in Schizophrenia: A Magnetic Resonance Imaging Study." This thesis was awarded *Magna plus cum laude*. (One paper from this work is published in *Biological Psychiatry*, with Laura as first author, and the second paper from this work is published in the *American Journal of Psychiatry*. She is currently a medical student at the University of Pittsburgh.)(See Bibliography portion of CV for first author and co-authorship on papers, abstracts and presentations).

2001-2002

Kathleen Rose, Class of 2002, Cognitive Neuroscience Major (Departments of Psychology and Biology), Harvard College. Senior Honors Thesis: "Morphologic Analysis of the Temporal Pole in Schizotypal Personality Disorder Using Magnetic Resonance Imaging." This thesis was awarded *Magna cum laude*.

2012-2013

Jessica Zuo, Class of 2013, Neurobiology Major, Departments of Neurobiology and Neuroscience, Harvard College. Senior Honors Thesis: "Clinical Symptoms Correlate

with White Matter Abnormalities in First-Episode Schizophrenia Patients". This thesis was awarded *Magna plus cum laude*.

- 2013-2014 Wendy Melissa Coronado, Class of 2014, Neurobiology Major, Department of Neurobiology and Neuroscience, Harvard College. Senior Honors Thesis: "Role of the hypothalamus in schizophrenia." This thesis was awarded *Magna cum laude*.

Independent Study Supervision of Undergraduates

- 1981-1982 Christine Gasperetti, Department of Psychology, Harvard College, Cambridge, MA (co-author publication in *Schizophr Bull*, 1986;12(3):484-495).
- 1982-1983 Ellyn Kestnbaum, Department of Psychology, Harvard College, Cambridge, MA (First author publication in *Am J Psychiatry*, 1988;145:944-949).
- 1982-1983 Andrew Busch, Department of Psychology, Harvard College, Cambridge, MA
- 1993-1994 Michelle Ballard, Department of Psychology, Wellesley College, Wellesley, MA. Worked for Independent Study credit.
- 1993-1994 Stephanie Rose, Department of Psychology, Wellesley College, Wellesley, MA. Worked for Independent Study credit.
- 1994-1995 Emma Kwong, Department of Psychology, Wellesley College, Wellesley, MA. Worked for Independent Study credit.
- 1994-1995 Laura Gravelin, Department of Psychology, Wellesley College, Wellesley, MA. Worked for Independent Study credit.
- 1997-1998 Michelle Harper, Department of Psychology, Harvard College, Cambridge, MA. Volunteered in the laboratory.
- 2000-2000 Elizabeth David, Department of Psychology, Wellesley College, Wellesley, MA. Volunteered in the laboratory then became research assistant, went to medical school.
- 2000-2000 Amanda Knowles, Department of Psychology, Wellesley College, Wellesley, MA. Worked for Independent Study credit.
- 2012- Jonathan Duskin, Boston University, Class of 2015, independent study.
- 2013-2014 Marcia Frimpong, Wellesley College, Class of 2015, independent study.
- 2013-2014 Helen Baker, Boston University, Class of 2014, independent study.

Other Advisor and Supervisory Responsibilities

- 1988- James Levitt, M.D., Instructor, and now Associate Professor, Clinical Neuroscience Division, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School and Psychiatry Neuroimaging Laboratory, Department of Psychiatry, Brigham and Women's Hospital, Harvard Medical School. (Milton Award for Scientific Research, Harvard University; VA Merit Award for research studies in schizophrenia). (See Bibliography portion of CV for first author and co-authorship on numerous abstracts, papers, and presentations.)

1991-1992	Jill Goldstein, Ph.D., retraining for neuroimaging and part of the Clinical Research Training Program, Department of Psychiatry, Harvard Medical School. Now Professor and Director of Women's Health Research, Brigham and Women's Hospital, Harvard Medical, Boston, MA. School, and Director of the Women's Health Center, Brigham and Women's Hospital. (See Bibliography portion of CV for co-authorship on abstracts, papers, and presentations.) (Currently Professor of Psychiatry and Medicine, and Director of Research for The Connor's Center for Women's Health, Brigham and Women's Hospital, Harvard Medical School.)
1992-1995	Dorothy Holinger, Ph.D., Instructor, Department of Psychiatry, Harvard Medical School. (See Bibliography portion of CV for first and co-authorship on papers, and presentations). (Currently in private practice.)
1992-	Margaret Niznikiewicz, Ph.D., Assistant Professor, Clinical Neuroscience Division and Director of Event Related Potential Studies at MMHC Imaging Laboratory, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School (<i>NARSAD Young Investigator Award</i> 1994-1996). Is co-PI on a VA MERIT Award and has received R01 grant funding from NIMH for her event-related potential studies of schizophrenia. (See also Bibliography portion of CV for first author and co-authorship on numerous abstracts, papers, and presentations.)
1992-2013	Dean Salisbury, Ph.D., Post-doctoral Research Fellow, then Assistant and now Associate Professor in the Department of Psychiatry, and Director of the Cognitive Neuroscience Laboratory, McLean Hospital, Harvard Medical School, and Director of First Episode Event Related Potential Studies, Laboratory of Neuroscience, Department of Psychiatry, Harvard Medical School (<i>NIMH Schizophrenia Young Investigator Award</i> 1993; <i>James S. McDonnell Foundation Award in Cognitive Neuroscience</i> 1993-1995; <i>NARSAD Young Investigator Award</i> 1995-1997; <i>NARSAD Young Investigator Award</i> 1997-1999). Has received R01 grant funding from NIMH for his event-related potential studies of schizophrenia. Now Associate Professor, Department of Psychiatry, Pittsburgh School of Medicine, Pittsburgh, PA. (See also Bibliography of CV for first author and co-authorship on numerous abstracts, papers, & presentations.)

Supervision of Research Assistants

Most of the RA's listed below have entered either a Ph.D. program or medical school, and many have made important contributors to the research work which has been recognized by co-authorship on publications.

1984-1985	Michael Bachop	2001-2002	Valerie Rosenberg
1985-1986	Ruth Ballinger	2002-2004	Daniel Schwartz
1985-1986	Melanie Cane	2002-2004	Rachel Berman
1986-1989	Brian Marcy	2002-2005	Lisa Lucia
1988-1989	Amy Ludwig	2002-2003	Laura Wiegand
1988-1990	Virginia Penhune	2002-2003	Sara Rabbit
1989-1990	Erik Mondrow	2002-2004	Meredith Klump
1990-1992	Seth Pollak	2002-2004	Sunnie Kim

1991-1992	R. Scott Smith	2003-2004	Aaron Baer
1991-1993	Mathew Kimble	2003-2004	Sophie Woolston
1992-1993	Lloyd Smith	2003-2005	Katherine Long
1992-1993	I-han Chou	2003-2005	Erin Connor
1992-1993	Lisa Kaplan	2003-2005	Matthew Koskowski
1993-1994	Sue Law	2003-2005	Kankshi Thakur
1993-1995	Jonathan Solinger	2004-2006	Courtney Brown
1993-1996	Andrea Sherwood	2004-2006	Adam Cohen
1994-1996	Maria Karapelou	2004-2006	Laura Rosnow
1994-1996	Jay Allard	2004-2006	Georgia Bushell
1995-1996	Robert Donnino	2004-2006	Mark Dreusicke
1995-1996	Richard Van Rhoads	2004-2006	Elizabeth Lewis
1995-1996	Sarah Carrigan	2005-2006	Lillian Hsu
1995-1997	Paola Mazzoni	2005-2008	Douglas Markant
1995-2000	Iris Fischer	2006-2008	Usman Khan
1996-1997	Sare Akdag	2006-2012	Katherine Smith
1996-2001	Engeat Teh	2006-2008	Charles Davidson
1996-1998	Creola Petrescu	2006-2010	Jorge Alvarado
1996-1998	Tanya Kisler	2007-2010	Laurel Bobrow
1996-1998	Joanna Gainski	2008-2013	Padmapriya Srinivasan
1997-1998	Claire Stylianopoulos	2008-2010	Douglas Terry
1997-2000	Deirdre Farrell	2008-2010	Andrew Rausch
1998-1999	Stephanie Fraone	2008-2012	Paula Pelavin
1998-1999	Alaka Pellock	2009-2011	Katherine Hawley
1998-1999	Danielle Synderman	2009-2012	Mai-Anh Vu
1998-1999	Christopher Dodd	2009-2012	Thomas Ballinger
1998-2000	Jonathan Sutton	2009-2012	Alexander LaVenture

1998-2000	Ashley Kricun	2010-2012	Rebecca King
1999-2000	Sara Corriveau	2011-2012	Daniel McCaffrey
1999-2001	Aleksandra Ciszewski	2011-2012	Kelsey Smith
1999-2001	Christopher Allen	2010-2014	Talis Swisher
1999-2001	Eric Berry	2012-2014	Kathryn Green
1999-2001	Carlye Griggs	2012-2014	Michelle Giwerc
2000-2001	Lynn Stravinski	2012-2014	Brian Dahlben
2000-2001	Elizabeth David	2012-2014	Eli Fredman
2000-2002	Anita Madan	2013-2014	Charles Yergatian
2000-2002	Sarah Toner	2014-	Anni Zu
2001-2002	Jessica Allen	2014-	Laura Levin
2001-2002	Megan Fagan	2014-	Dominick Newell
2001-2003	Magdelena Spencer		
2001-2004	Susan Demeo		
2001-2003	Hal Ersner-Hershfield		
2001-2003	Nicola Sumorok		

Summer Research Internships

1988	Melanie Cane
1989-1993	Jennifer Haimson
1990	Erik Mondrow
1991	Erik Mondrow
1994	Maaike Van Ingen
1995-1996	Claire Stylianopoulos

Summer Internships, Continued with the Stanley Scholars Program, Stanley Medical Research Institute

Dr. Shenton was selected by the Stanley Foundation to be a *Senior Scientist Mentor for the Stanley Scholars Program*. The Scholars Program, established by this Foundation, selects Senior Mentors from across North America to supervise the activities of trainees in summer research positions. Dr. Shenton was selected to be one of 27 such mentors across the US and Canada to participate in this program, which was funded from 1997 to 2004. During this 7 year period 130 students were funded, working with 44 different faculty members. This program

provided a unique educational opportunity for high school students, undergraduate students, and medical students. In fact, this was the first such program to include high school students. The main goal of this program was to introduce students to hands-on experience working in a research laboratory that was focused on understanding mental illness. For most of these students, this was their first experience working in a laboratory.

<i>Year</i>	<i>Student</i>	<i>Preceptor(s)</i>
1997	Jay Allard	Cynthia Wible, Ph.D.
	Robert Anagnoson	Jill Goldstein, Ph.D.
	Sarah DeLong	Margaret Niznikiewicz, Ph.D.
	Brett Rutherford	Dean Salisbury, Ph.D.
	Tanya Sitnikova	Dean Salisbury, Ph.D.
	Paula Teixeira	Robert Greene, Ph.D., M.D.
	Matthew Wecksell	Martha Shenton, Ph.D.
	Nyasha Warren	Brian O'Donnell, Ph.D.
	Friederika Aceto	Heidi Gralinski, Ph.D./Stuart Hauser, M.D., Ph.D.
	Sare Akdag	Paul Nestor, Ph.D.
1998	Gina Clark	Philip Holzman, Ph.D./Deborah Levy, Ph.D.
	Massimo DeSantis	Yoshio Hirayasu, M.D., Ph.D./Melissa Frumin, M.D.
	Jennifer Doubilet	Robert Waldinger, M.D.
	Polina Golland	Melissa Frumin, M.D.
	Carolyn Kloek	Heidi Gralinski, Ph.D./Stuart Hauser, M.D., Ph.D.
	Briana Martino	Curtis Deutsch, Ph.D.
	Silvina Moncho	Paul Nestor, Ph.D.
	Juliana Pare-Blagoev	Cynthia Wible, Ph.D.
	Rima Saad	Lisa Najavits, M.D.
	David Sherman	Curtis Deutsch, Ph.D.
	Tatiana Sitnikova	Dean Salisbury, Ph.D.
	Shoshana Sokoloff	Jill Goldstein, Ph.D.
	Michael Ward	Larry Seidman, Ph.D.
	Alexander Wolfe	Margaret Niznikiewicz, Ph.D.

	Janos Zahajsky	Martha Shenton, Ph.D.
1999	Sarah Anh	Chandlee Dickey, M.D.
	Seema Arora	Jane Anderson, Ph.D./Dean Salisbury, Ph.D.
	Payal Bansal	James Levitt, M.D.
	Gina Clark	Philip Holzman, Ph.D./Deborah Levy, Ph.D.
	Elizabeth David	Marek Kubicki, M.D., Ph.D./Melissa Frumin, M.D.
	Elton Dean III	Jill Goldstein, Ph.D.
	Jennifer Doubilet	Robert Waldinger, M.D.
	Ana Garnecho	Dean Salisbury, Ph.D.
	S. Duke Han	Paul Nestor, Ph.D.
	Thomas Knowles	Joseph P. Coyle, M.D.
	Silvina Moncho	Paul Nestor, Ph.D.
	Jon-Paul Pepper	Margaret Niznikiewicz, Ph.D.
	Marcela Ramirez	Laverne Gugino, M.D.
	Heidi Wencel	Larry Seidman, Ph.D.
	Christopher Zoumalan	Martha Shenton, Ph.D./Ron Kikinis, M.D.
2000	Amron Bevels	Judith Ford, Ph.D.
	Elton Dean III	Jill Goldstein, Ph.D.
	Daniel Fox	Melissa Frumin, M.D.
	Michele Friedman	Margaret Niznikiewicz, Ph.D./Paul Nestor, Ph.D.
	Aaron Jackson-Bonner	Dean Salisbury, Ph.D.
	S. Duke Han	Paul Nestor, Ph.D./Margaret Niznikiewicz, Ph.D.
	Amanda Knowles	Chandlee Dickey, M.D.
	Joshua Maniscalo	Robert Waldinger, M.D.
	Eric Morrow	Laura Prager, M.D.
	Andrea Okruch	Dean Salisbury, Ph.D.
	Elizabeth Olsen	Marek Kubicki, M.D., Ph.D.

	Megan Niman	Deborah Titone, Ph.D.
	Jennifer Tobin	Robert Strecker, Ph.D.
2001	Laura Epstein	Dean Salisbury, Ph.D./Chandlee Dickey, M.D.
	Trifon Fitchorov	Marek Kubicki, M.D., Ph.D.
	Daniel Fox	Carl-Fredrik Westin, Ph.D./Melissa Frumin, M.D.
	Xiao Lao	Steve Matthysee, Ph.D.
	Natasha Gosek	Melissa Frumin, M.D.
	Aaron Strange	Robert Strecker, Ph.D.
	Laura Wiegand	Martha E. Shenton, Ph.D.
	Patrick McGann	Joseph P. Coyle, M.D.
	Erin Rand-Giovannetti	Deborah Titone, Ph.D.
	Amber Bonogofsky	Judith Ford, Ph.D.
	Caroline Connor	Phil Holzman, Ph.D.
	Daniel Fishman	Robert Waldinger, M.D.
	Patricia Sinaiko	Stuart Hauser, M.D., Ph.D./Heidi Gralinski, Ph.D.
	Terri Huh	Paul Nestor, Ph.D./Cynthia Wible, Ph.D.
	Safa Sadeghpour	Francine Benes, M.D., Ph.D.
	Carlene MacMillan	Heidi Gralinski, Ph.D./Stuart Hauser, M.D., Ph.D.
2002	Laura Epstein	Chandlee Dickey, M.D.
	Jessica Santiccioli	Margaret Niznikiewicz, Ph.D.
	Joshua Seidman	Robert Stickgold, Ph.D.
	Aaron Strong	Robert Strecker, Ph.D.
	Michael Niznikiewicz	Martha E. Shenton, Ph.D./Marek Kubicki, M.D., Ph.D.
	Erica Lee	Jill Goldstein, Ph.D.
	Mina Xu	Chandlee Dickey, M.D.
	Christopher Allen	Paul Nestor, Ph.D.
	Seth Willen	Barbara Wolfe, Ph.D./David Jimerson, M.D.

	Ethan Schechter	Larry Seidman, Ph.D.
	Lori Schwartz	Dean Salisbury, Ph.D.
	Pauline Kim	Deborah Titone, Ph.D.
	Moira Traci	Robert Waldinger, M.D.
	Patrick Thronson	Deborah Levy, Ph.D./Phil Holzman, Ph.D.
	Tanya Rinderknecht	Judith Ford, Ph.D.
	Kartik Sreenivasan	Daniel Mathalon, Ph.D., M.D.
	Carlene MacMillan	Stuart Hauser M.D., Ph.D./Heidi Gralinski, Ph.D.
	Ramy Joseph El-Khoury	Robert Strecker, Ph.D.
	Ruth Perlmutter	Kevin Spencer, Ph.D.
	Katherine Rose	Chandlee Dickey, M.D./Martha E. Shenton, Ph.D.
	Olga Valdman	Kevin Spencer, Ph.D./Paul Nestor, Ph.D.
2003	Caroline Conner	Miles Cunningham, M.D., Ph.D.
	Victoria Jo	Martha E. Shenton, Ph.D./Chandlee Dickey, M.D.
	Na Young Ji	Martha E. Shenton, Ph.D./Chandlee Dickey, M.D.
	Mina Xu	Chandlee Dickey, M.D.
	Payman Zamani	James Levitt, M.D.
	Grant Thomas-Lepore	Carl-Fredrik Westin, Ph.D.
	Jacob Albertson	Carl-Fredrik Westin, Ph.D./Martha E. Shenton, Ph.D.
	Ruth Perlmutter	Kevin Spencer, Ph.D.
	Christopher Allen	Paul Nestor, Ph.D.
	Andrea Klunder	Chandlee Dickey, M.D./Martha E. Shenton, Ph.D.
	S. Duke Han	Cynthia Wible, Ph.D.
	Amanda Rivers	Mahesh Thakker, Ph.D.
	Julie Breines	Stuart Hauser, M.D., Ph.D./Heidi Gralinski, Ph.D.
	Jessica Santiccioli	Margaret Niznikiewicz, Ph.D.

	Katrik Sreenivasan	Daniel Mathalon, Ph.D., M.D.
	Charles Kochan, III	Judith Ford, Ph.D.
	Alexa Irish	Larry Seidman, Ph.D.
	Andrea Roe	Deborah Levy, Ph.D./Philip Holzman, Ph.D.
	Tad Brunye	Deborah Yurgelun-Todd, Ph.D.
	Julia Gefter	Robert Waldinger, M.D.
2004	Jacob Albertson	Carl-Fredrik Westin, Ph.D.
	Alexa Irish	Chandlee Dickey, M.D.
	Peter Epstein	Chandlee Dickey, M.D./Martha Shenton, Ph.D.
	Michael Niznikiewicz	Kevin Spencer, Ph.D.
	Dovid Greene	Chandlee Dickey, M.D.
	Charles Kochan, III	Judith Ford, Ph.D.
	Katrik Sreenivasan	Daniel Mathalon, Ph.D., M.D.
	Ruth Perlmutter	Kevin Spencer, Ph.D.
	Christopher Allen	Margaret Niznikiewicz, Ph.D.
	Ankit Patel	Mahesh Thakkar, Ph.D.
	Christopher Harte	Deborah Levy, Ph.D.
	Joshua Seidman	Larry Seidman, Ph.D.
	Michael Schiller	Larry Seidman, Ph.D.
	Jenna Houranieh	Margaret Niznikiewicz, Ph.D.
	Lonnie Spinelli	Robert Waldinger, M.D.
	Sarah Erich	Stuart Hauser, M.D., Ph.D./Heidi Baker-Gralinski, Ph.D.
	KC LeGrand Collins	Dean Salisbury, Ph.D.
	Mukund Sureshbabu	Dean Salisbury, Ph.D.
2005	Alexa Irish	Martha E. Shenton, Ph.D.
	Michael Niznikiewicz	Paul Nestor, Ph.D.

Summer Research Internships, and Research Internships, following end of Stanley Fellowships

2005	Christopher Webber	Martha E. Shenton, Ph.D. (Minority supplement to R01)
	Anjuli Singh	Chandlee Dickey, M.D. (Undergraduate Tufts University.)
2006	James Fish	Martha E. Shenton, Ph.D./KhangUk Lee, M.D. (High School Student from Cambridge Ridge and Latin, and the Program Success, HMS)
	Matthew Isabel	Martha E. Shenton, Ph.D. (High School Student from the Brooks School)
	Jasmine Rollins	Marek Kubicki, M.D., Ph.D./Martha E. Shenton, Ph.D. (High School Student from the Human Resources Summer Internship Program, BWH)
	Sophie Norstrom	Motoiaki Nakamura, M.D./Martha E. Shenton, Ph.D.(High School Student from Norway)
2007	Douglas Terry	Marek Kubicki, M.D., Ph.D./Martha E. Shenton, Ph.D. (Undergraduate at Tufts University)
	Jonathan Hendrickson	Marek Kubicki, M.D., Ph.D./Martha E. Shenton, Ph.D. (High School Student from the Brooks School)
	Jacqueline Goldberg	James Levitt, M.D./Martha E. Shenton, Ph.D. (Medical Student from Upstate Medical University College of Medicine)
	Morgan Circa	James Levitt, M.D./Martha E. Shenton, Ph.D. (Undergraduate, West Virginia University)
	John Chakerian	Chandlee Dickey, M.D./Martha E. Shenton, Ph.D. (Undergraduate, Stanford University)
	Melissa Mendoza	Martha E. Shenton, Ph.D. (High School Student from the Windsor School and the Human Resources Summer Internship Program, BWH)
	Francois Budin	Sylvain Bouix, Ph.D. (Graduate student in Computer Science and Engineering, University of Lyon, France)
2008	Rebecca King	Thomas Whitford, Ph.D. (Undergraduate from the University of Rochester, Rochester, NY)
	Michelle Chiu	Zora Kikinis, Ph.D. (High School Student from the Brooks School)
	Eric Melonoka	Sylvain Bouix, Ph.D. and Marek Kubicki, M.D., Ph.D. (Undergraduate from Brigham Young University)
	Jalpa Patel	Sylvain Bouix, Ph.D. (Masters student at Wayne State University)

	James Malcolm	Yogesth Rathi, Ph.D. (3 rd year graduate student in Computer Science and Electrical Engineering, Georgia Tech)
2009	Rebecca King	Thomas Whitford, Ph.D. (Undergraduate from the University of Rochester, Rochester, NY)
	Eric Melonokas	Sylvain Bouix, Ph.D. and Marek Kubicki, M.D., Ph.D. (Undergraduate from Brigham Young University)
	Priyanka Chilakamarri	Jason Schneiderman, Ph.D. (Undergraduate from Brandeis University)
	Sam Burnim	Zora Kikinis, Ph.D. (High School Student The Brooks School)
	Tali Swisher	Thomas Whitford, Ph.D. and Marek Kubicki, M.D., Ph.D. (Undergraduate Vassar College)
	Sam Atwood	Jason Schneiderman, Ph.D. (B.S. in 2008 from Skidmore College)
	Po-Chang Hsu	Martha E. Shenton, Ph.D. (Master's Thesis Candidate, Harvard Extension Division, Neurobiology)
	Khalima Bolden	Martha E. Shenton, Ph.D. and Jason Schneiderman, Ph.D. (Master's Candidate, Boston University, Department of Psychology)
2010	Khalima Bolden	Martha E. Shenton, Ph.D. and Jason Schneiderman, Ph.D. (Master's Candidate, Boston University, Department of Psychology)
	Priyanka Chilakamarri	Jason Schneiderman, Ph.D. (Undergraduate Brandeis University – Class of 2011)
	Andrew Hyatt	Zora Kikinis, Ph.D. (Undergraduate Middlebury College, Class of 2012)
	Jacob Besen	Thomas Whitford, Ph.D. (High School Student – Brooks School)
	Edward Vargas	Sylvain Bouix, Ph.D. (High School Student – Herricks Senior High School) (via MIT-Research Science Institute)
	Borah Kim	Zora Kikinis, Ph.D. and Yogesh Rathi, Ph.D. (Resident in Psychiatry, Seoul National University College of Medicine, South Korea)
	Junhee Lee	Sang-Hyuk Lee, M.D., Ph.D. (Medical Student, Seoul National University College of Medicine, South Korea)
2011	Jennifer Anderson	Marek Kubicki, M.D., Ph.D. (Undergraduate Emmanuel College – 2011)
	David King	Sylvain Bouix, Ph.D. (Undergraduate University of Rochester , Class of 2014)
	Andre Michalowski	Marek Kubicki, M.D., Ph.D. (Undergraduate University of Massachusetts - Amherst - 2014)

	Danielle Pulton	Jennifer Fitzsimmons, M.D. (Undergraduate Brandeis University, Class of 2012)
	Mariana Shirokova	Jim Levitt, M.D. (Undergraduate University of Massachusetts – Amherst, Class of 2013)
	Felipe Hernandez	Sylvain Bouix, Ph.D. (High School Student in the MIT RSI program - from Louisiana School for Math, Science, and the Arts, Class of 2012)
	Shizhi (Simon) Liang	Zora Kikinis, Ph.D. (Brooks School, Class of 2012)
	Jean Alper	Mai-Anh Vu and James Levitt, M.D. (Emmanual College, Class of 2012)
	Christian Baumgartner	Yogesh Rathi, Ph.D. (Master's candidate ETH, Zurich, Switzerland)
	Sung Joon Cho	Zora Kikinis, Ph.D. (M.D., M.S., Ph.D. candidate CHA University Medical School, Seoul, South Korea)
	Marc Muehlmann	Inga Koerte, M.D. (Medical Student Ludwig-Maximillian-University, Munich, Germany)
	Jessica Zuo	Martha Shenton, Ph.D./Marek Kubicki, M.D., Ph.D. (Harvard College, Class of 2013)
	Neil Houston	James Levitt, M.D. (Roanoke College, B.A.)
2012	Jessica Zuo	Martha Shenton, Ph.D./Marek Kubicki, M.D., Ph.D. (Harvard College, Class of 2013)
	Marc Muehlmann	Inga Koerte, M.D. (Medical Student Ludwig-Maximillian-University, Munich, Germany)
	David Kaufmann	Inga Koerte, M.D. (Medical Student Ludwig-Maximillian-University, Munich, Germany)
	Elizabeth Hartl	Inga Koerte, M.D. (Medical Student Ludwig-Maximillian-University, Munich, Germany)
	Andre Michalowski	Marek Kubicki, M.D., Ph.D. (Undergraduate University of Massachusetts – Amherst, Class of 2014)
	Chandler Dunn	Zora Kikinis, Ph.D., and Jennifer Fitzsimmons, M.D. (High School Student, Brooks School)
	Sindy Tan	Sylvain Bouix, Ph.D. (High School Student – Hunter College High School, Class of 2013)(via Research Science Institute-MIT)
	Mucahid Sarisoy	James Levitt (Medical Student – Marmara University, School of Medicine, Istanbul, Turkey)
	Yilmaz Satirer	Jennifer Fitzsimmons and Martha Shenton (Medical Student – Hacettepe University School of Medicine, Ankara, Turkey; 621 rank out of 1.8 million for university entrance exam)

	Hitomi Takahashi	Taiga Hosokawa, M.D., Ph.D. (Simmons College, A.B., Class of 2012, magna cum laude)
	Nora Karara	Inga Koerte, M.D. (Medical Student at the University of Bonn, Germany)
	Kang-Ik Cho	Martha Shenton, Ph.D. (Observer, BSc in Neuroscience and Mental Health in Biomedical Sciences, Imperial College London, United Kingdom, 2010, and working in Jun Soo Kwon's Laboratory at Seoul University, South Korea)
	Jonathan Duskin	Martha Shenton, Ph.D. (Undergraduate in Neuroscience and Philosophy, internship/course credit from Boston University)
	Khatab Yacoub	Martha Shenton, Ph.D., Brian Dahlben, M.S., Marek Kubicki, M.D., Ph.D. (Post-BA University of Texas)
	Nitika Anand	Martha Shenton, Ph.D. (Undergraduate Brandeis University, Class of 2013)
2013	Michael Mayinger	Inga Koerte, M.D. (Medical Student at Ludwig-Maximillian-University, Munich, Germany)
	Jonathan Duskin	Martha Shenton, Ph.D. (Undergraduate in Neuroscience and Philosophy, internship/course credit from Boston University, Class of 2015)
	Tommy Tang	Zora Kikinis, Ph.D. (Brooks Student, Class of 2014)
	Phoebe Cai	Sylvain Bouix, Ph.D. (High School Student in the MIT RSI program – Long Island, NY, Class of 2014)
	Halen Baker	Marek Kubicki, M.D., Ph.D. (Undergraduate Boston University class of 2014)
	Marcia Frimpong	Martha Shenton, Ph.D. (Undergraduate Wellesley College class of 2015)
	Melissa Coronado	Martha Shenton, Ph.D., Marek Kubicki, M.D., Ph.D. (undergraduate senior honors thesis student Harvard College, Class of 2014)
	Caroline Loy	Zora Kikinis, Ph.D. (undergraduate Cornell University, Class of 2015)
	Daniel Daniluk	Marek Kubicki, M.D., Ph.D. (undergraduate UMASS, Amherst, Class of 2015)
	Marc Muehlmann	Inga Koerte, M.D. (Medical Student Ludwig-Maximillian-University, Munich, Germany)
2014	Halen Baker	Zora Kikinis, Ph.D. (undergraduate Boston University, Class of 2014)
	Jonathan Duskin	Ofer Pasternack, Ph.D. (undergraduate in Neuroscience and Philosophy, internship/course credit from Boston University; received a Howard Hughes Medical Institute –HHMI- Summer Lab Experience Summer Stipend, Class of 2015)

Daniel Daniluk

Marek Kubicki, M.D., Ph.D. (Undergraduate UMASS, Amherst, Class of 2015)

Marcia Frimpong

Martha Shenton, Ph.D. (Undergraduate Wellesley College Class of 2015)

Sophi LeRoux

Sylvain Bouix, Ph.D. (Master's student, Université Paris-EST Créteil, Advanced Institute of Biosciences of Paris (ISBS), Class of 2015)

Ahmed Maklouf

Hesham Hamoda, M.D. (Graduate from Ain Shams Medical School in Cairo, Egypt)

Jakob Hufschmidt

Inga Koerte, M.D. (Medical Student, University of Munich, Germany)

Anna Willems

Inga Koerte, M.D. (Medical Student, University of Munich, Germany, Scholarship from Cusanus Werk, Germany)

Marc Muehlmann

Inga Koerte, M.D. (Medical Student Ludwig-Maximilian-University, Munich, Germany)

Irem Durgan

Ofer Pasternak, Ph.D. (6th Year Medical Student Istanbul University)

Elan Baskir

Jennifer Fitzsimmons, M.D. (Undergraduate, Washington University, Class of 2015)

Isobel Green

Inga Koerte, M.D. (Undergraduate, Harvard University, Class of 2017)

Analiese Fernandes

Inga Koerte, M.D. (High School Student, Brooks School, Class of 2015)

Seiji Engelkemier

Zora Kikinis, Ph.D. (High School Student, Brooks School, Class of 2015)

Esmanur Demir

Jennifer Fitzsimmons, M.D. (Medical Student, Trakya University School of Medicine, Edime Turkey, Class of 2017)

Madhura Baxi

Marek Kubicki, M.D., Ph.D. and Yogesh Rathi, Ph.D. (Undergraduate at Auburn University, Class of 2015)

Agata Staszal

Marek Kubicki, M.D., Ph.D and Ofer Pasternak, Ph.D. (Student in Masters Degree Program in Computer Science, Lodz University of Technology, Class of 2016)

Yusra Yildrim

Peter Savadjiev, Ph.D., and Inga Koerte (Medical Student, Sifa University School of Medicine, Class of 2017)

Jenny Wang

Sylvain Bouix, Ph.D. (High School Student in the MIT RSI program – North Carolina School of Science and Mathematics, Class of 2015)

Esra Dursun

Inga Koerte, M.D., and Zora Kikinis, Ph.D. (Medical Student, Marmara University School of Medicine, Istanbul, Turkey, Class of 2018)

Timothy Gebhard

Inga Koerte, M.D., and Sylvain Boiux, Ph.D. (Undergraduate at Karlsruhe Institute of Technology, Class of 2015)

Sung-Jae Lee

Martha Shenton, Ph.D. (Resident in Psychiatry, Class of 2015, Bundang CHA Medical Center, CHA University School of Medicine, Gyeonggido, South Korea)

Regional, National, and International Contributions:*Invited Presentations (primary or co-author)*

- 1978 Paper presented on Patient Report of Problems and Staff Attention to Patient Problems as Predictors of Treatment Outcome, at *the 131st Annual Meeting of the American Psychiatric Association* Panel Discussion of Compliance with Recommended Follow-up Treatment, Atlanta, GA.
- Paper presented on The Problem Oriented Treatment Record, in Symposium on Advances in Empirical Assessment in Clinical Settings, *American Psychology Association*, Toronto, Ontario, Canada.
- 1979 Paper presented on The Assessment of Patient Outcome Based on the Problem Oriented Record, at *the 132nd Annual Meeting of the American Psychiatric Association* Panel Discussion on the Problem Oriented System in Psychiatry, Chicago, IL.
- 1981 Invited speaker; Thought Disorder in Psychotic Patients, presented at *FolchiPi Lecture Series*, Mailman Research Center, McLean Hospital, Belmont, MA.
- Invited speaker; Discriminability of Thought Disorder in Psychotic Patients, presented at *Psychopathology Lecture Series*. William James Hall, Harvard University, Cambridge, MA.
- Paper presented on Diagnostic Discriminability of Thought Disorder in Mania and Schizophrenia, *American Psychological Association*, Washington, DC.
- 1985 Paper presented on P300 and Spectral Topography in Schizophrenics and Normals, *IVth World Congress of Biological Psychiatry*, Philadelphia, PA.
- 1987 Paper presented on P300 Positive Symptom Correlates in Schizophrenia at *the 140th Annual Meeting of the American Psychiatric Association Symposia Session*, Chicago, IL
- 1989 Paper presented on P300 and Schizophrenia at the Topographical Mapping of Brain Electrical Activity: Neuropsychiatric and Neuropsychological Applications, A Symposium, *The Institute of Living*, Hartford, CT.
- Paper presented on Late Auditory Event-Related Potentials and an Excitotoxicity Model of Pathology in Schizophrenia, at *Department of Veterans Affairs Research Symposium on Schizophrenia*, Denver, CO.
- 1990 Invited speaker; Brain Imaging Techniques in Schizophrenia, Grand Rounds Presentation, *Department of Psychiatry, Burbank Hospital*, Fitchburg, MA.
- Paper presented, on Computer Assisted Volumetric Measurements of Brain and CSF Spaces in Schizophrenics and Normal Control Subjects using MRI, presented at the *Fifth Annual Meeting of the Society for Research in Psychopathology*, Boulder, CO.
- 1991 Invited speaker; Imaging Studies in Schizophrenia: Update, presented at the *Massachusetts Mental Health Center Psychopharmacology Lecture Series*, Boston, MA.
- Paper presented on P3 Amplitude in Schizophrenic Patients and Their Family Members, *Biological Psychiatry*.

Paper presented on Premorbid Adjustment in Schizophrenia, *Biological Psychiatry*.

Paper presented on Does the Attentional Asymmetry in Schizophrenia Reflect a Dysfunction in the Left Hemisphere Inhibitory Operations? *Biological Psychiatry*.

1992 Paper presented on Temporal Lobe Abnormalities in Schizophrenia are Related to An Increase in Thought Disorder: A computerized, quantitative MRI study, *Biological Psychiatry*.

Paper presented on Auditory P300 Amplitude and Left Posterior Superior Temporal Gyrus Volume Reduction in Schizophrenia, *Biological Psychiatry*.

Paper presented on P300 Asymmetries and Temporal Lobe Pathology, at Symposium on Psychosis and the Temporal Lobe, *145th Annual Meeting of the American Psychiatric Association*.

Invited speaker; Temporal Lobe Structural Abnormalities in Schizophrenia, presented at the “*Scientific Symposium on Psychopathology: The Evolving Science of Mental Disorder*,” to honor Professor Philip Holzman, American Academy of Arts & Sciences, Cambridge, MA.

Paper presented on P300 Asymmetry in Schizophrenia: Association with Left Posterior Superior Temporal Gyrus Volume Reduction. Symposium on ERP aspects of schizophrenia, *EPIC X Congress*, Budapest, Hungary.

1993 Paper presented on Temporal Lobe Abnormalities in Schizophrenia, *at the International Congress on Schizophrenia Research*, Colorado Springs, CO.

Paper presented on Alterations in Left Temporal and Temporal Lobe Gyral Pattern in Schizophrenia, *Biological Psychiatry*, San Francisco, CA.

Paper presented on Temporal Lobe: MRI, ERP, and Clinical Pathology, in symposium: “*Psychoses: Structure and function in three brain systems*,” *at the 146th Annual Meeting of the American Psychiatric Association*, San Francisco, CA.

Paper presented on Clinical Symptoms and Temporal Lobe MR Volume Measures in Schizophrenia, at the Panel Group: “*Dopamine and Cognition: The Schizophrenia Connection*,” *32nd Annual Meeting of the American College of Neuropsychopharmacology*, Honolulu, Hawaii.

Paper presented Temporal Lobe Volume Reduction and Thought Disorder in Schizophrenia, at the Panel Group: “*Models of Psychosis: Pathophysiology*,” *32nd Annual Meeting of the American College of Neuropsychopharmacology*, Honolulu, Hawaii.

1994 Invited speaker; Imaging Studies: Relationship with Symptomatology, at “*New Developments in Schizophrenia*,” University of Utrecht, The Netherlands.

Paper presented on 3D Warping of Digital Anatomic Atlas onto Patient's Data Sets, at the *12th Annual Meeting of the Society for Magnetic Resonance Imaging*, Dallas, TX.

Paper presented on the Superior Temporal Gyrus and Thought Disorder, presented in the symposium session, “*Schizophrenia: Imaging and a new pathophysiology*,” the sesquicentennial meeting of the *147th Annual Meeting of the American Psychiatric Association*, Philadelphia, PA.

Paper presented on Warp Speed: MRI Windows on the Brain and Behavior, in the symposium session, "Schizophrenia: Imaging and a new pathophysiology," the sesquicentennial meeting of the *147th Annual Meeting of the American Psychiatric Association*, Philadelphia, PA.

Paper presented on 3D Surface Renderings of the Planum Temporale in Schizophrenia: A Quantitative MRI Study, at the ninth annual meeting of the *Society for Research in Psychopathology*, Miami FL.

Invited speaker; Temporal Lobe Findings in Schizophrenia, at *the Massachusetts Mental Health Center Psychopharmacology Lecture Series*, Boston, MA.

Paper presented on The Frontal Lobe in Schizophrenia: ERP, MRI, and Neuropsychological Data, at the Symposia, Converging Perspectives on Frontal Lobe, at the *Society for Psychophysiological Research*, Atlanta, GA.

Paper presented on Does P3 Topography Discriminate Schizophrenic Psychosis from Affective Psychosis? Presented at *the 24th Annual Meeting of the Society for Neuroscience*, Miami FL.

Paper presented on An ERP Study of P3A to Novel Sounds and P3B to Target Tones in Schizophrenia, presented at *the 24th Annual Meeting of the Society for Neuroscience*, Miami FL.

Paper presented on Parcellation of Human Prefrontal Cortex Using High Resolution MRI: A Volumetric Study of Schizophrenic and Control Subjects, presented at *the 24th Annual Meeting of the Society for Neuroscience*, Miami, FL.

1995 Invited speaker; Neuroimaging Studies in Schizophrenia, *Okinawa Psychiatric Association*, University of the Ryukyus, Nishihara Town, Okinawa, Japan.

Invited speaker; Temporal Lobe Findings in Schizophrenia, *Grand Rounds Presentation, Department of Psychiatry, University of Alabama*, Birmingham, AL.

Paper presented on Temporal Lobe Dysfunction and Schizotypal Personality Disorder, presented in the Symposium session, "Brain structure and function in the schizophrenia spectrum," *148th Annual Meeting of the American Psychiatric Association*, Miami, FL.

Paper presented on Schizotypal Disorder: Cognitive, Behavioral, and Neuropathological Indicators, *Biological Psychiatry*, Miami, FL.

Invited speaker; The Relationship Between Temporal Lobe Abnormalities and Schizophrenia, presented at the *Behavioral Neurology Unit, Beth Israel Hospital*, Boston, MA.

Paper presented on Neurologic, Neurophysiologic, and Neuroanatomic Abnormalities in Chronic, Combat-Related PTSD, presentation within the symposium, "Neurobiological Advances in PTSD," *2nd International Conference on New Directions in Affective Disorders*, Jerusalem, Israel.

Invited speaker; Anatomical Abnormalities in the Temporal Lobe in Schizophrenia, presented in symposia on neuroimaging and schizophrenia, *8th Annual Congress of European College of Neuropsychopharmacology*, Venice, Italy.

Paper presented on Abnormal P3 Topography in First Episode Schizophrenia-Like Psychosis, *The 35th Annual Meeting of the Society for Psychophysiological Research*, Toronto, Ontario, Canada.

Paper presented on the Harvard Brain Atlas: A Teaching and Visualization Tool, at the Symposium on Biomedical Visualization. *IEEE Visualization Conference 1995*, Atlanta, GA. Invited speaker; Neuroimaging in Schizophrenia, *Mental Health and Behavioral Sciences Council, Clinical Case Conference Schedule, Department of Psychiatry, VAMC-Brockton*, Harvard Medical School, Brockton, MA.

Paper presented on A Neural Circuit Model of Schizophrenic Pathology: Failure of Recurrent Inhibition, presented as part of the panel session, "The Neurophysiology of Abnormal Function in Schizophrenia Spectrum: Risk and Protective Factors", *34th Annual Meeting of the American College of Neuropsychopharmacology*, San Juan, Puerto Rico.

1996 Invited speaker; Neurocognitive Correlates of Schizotypal Personality Disorder, *Society for Research in Psychopathology*, Atlanta, GA.

Invited speaker; MRI and ERP Findings in Schizophrenia and Schizophrenia Spectrum Disorders, *Colloquium Series: Psychology Department, Harvard University*, Cambridge, MA.

Invited speaker; Structural, Neurophysiological, and Clinical Indicators of Schizophrenia, *Grand Rounds Presentation, Beth Israel Hospital Psychiatry Grand Rounds*, Boston, MA.

Paper presented on Schizophrenia Disorders: Neurodevelopmental and Onset Vulnerability Factors, *Biological Psychiatry*.

Paper presented on MRI Structural and Electrophysiological/Neuropsychological Functional Correlates of Schizotypal Personality Disorder, *35th Annual Meeting of the American College of Neuropsychopharmacology*, San Juan, Puerto Rico.

1997 Invited speaker; Neuroimaging Studies in Schizophrenia and Schizophrenia Spectrum Disorders, *Grand Rounds Presentation at the Massachusetts General Hospital Psychiatry Grand Rounds*, Boston, MA.

Invited speaker; *Workshop on Neuroimaging, Harvard Department of Psychiatry Neuroimaging Day, McLean Hospital*, Belmont, MA.

Paper presented on Temporal P300 Asymmetry in First Episode Schizophrenia, *International Congress of Schizophrenia Research*, Colorado Springs, CO.

Paper presented on schizophrenia: MRI, Electrophysiological and Cellular Data Bearing on Some Current Issues and Controversies, *Biological Psychiatry*, San Diego, CA.

Paper presented on Morphologic and Cognitive Indicators of Schizotypal Personality Disorder, *Biological Psychiatry*, San Diego, CA.

Paper presented on MRI and ERP Abnormalities in First Episode Psychosis, *Biological Psychiatry*, San Diego, CA.

Paper presented on Left Temporal P3 Reductions in Chronic and First Episode Schizophrenia, *Biological Psychiatry*, San Diego, CA.

Paper presented on Abnormal ERP Activity Despite Normal Performance on Homographs in Schizophrenia, *Biological Psychiatry*, San Diego, CA.

Invited Speaker; MRI Findings in Schizophrenia, *Department of Psychiatry, University of North Carolina*, Chapel Hill, NC.

Invited Speaker; Clinical and Temporal Lobe MRI Findings in Schizophrenia, *Department of Psychiatry, Grand Rounds Presentation, University of California, Davis, CA.*

Paper presented on Brain Imaging in Psychiatric Disorders, the *XVI World Congress of Neurology, Buenos Aires, Argentina.*

1998 Invited speaker; MRI as a Window into the Brain, *Neurology Residency Training Program (BWH, MGH, West Roxbury/Brockton VAMC), Department of Neurology, Harvard Medical School.*

Invited speaker; MRI, ERP Findings in Schizophrenia and Schizophrenia Spectrum Disorders, *Colloquium Series: Psychology Department, Harvard University, Cambridge, MA.*

Invited speaker, Zubin Memorial Award for Research in Psychopathology; MRI, ERP, and Clinical Indicators of Schizophrenia, *Grand Rounds Presentation, Columbia University College of Physicians and Surgeons, New York State Psychiatric Institute, New York, NY.*

Invited Speaker; Workshop; Application of Imaging and Image Processing Tools to the Investigation of Schizophrenia. *Medical Image Computing and Computer Assisted Intervention (MICCAI), MIT, Cambridge, MA.*

1999 Paper presented on Shape Differences in the Hippocampus in Schizophrenia, *at the 152nd Annual Meeting of the American Psychiatric Association, Washington, DC.*

Paper presented on progressive MRI volume change in schizophrenia, *at the 152nd Annual Meeting of the American Psychiatric Association, Washington, DC.*

Paper presented on Caudate Volume in Schizotypal Personality Disorder: An MRI Study in Neuroleptic-Naive Subjects, *at the 152nd Annual Meeting of the American Psychiatric Association, Washington, DC.*

Invited speaker; MRI Findings in Schizophrenia, *Grand Rounds Presentation, Department of Radiology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA.*

Invited speaker; MRI Findings in Schizophrenia, *Grand Rounds Presentation, Behavioral Neurology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA.*

2000 Invited Speaker; *Career Opportunities in Academia, presentation to PGY-III and IV Residents in the Residency Training Program, Department of Psychiatry, Brockton-VAMC, Harvard Medical School.*

Invited Speaker; MRI Findings in Schizophrenia and Schizotypal Personality Disorder, *Seminar Series, Residency Training Program, Department of Psychiatry, Brockton-VAMC, Harvard Medical School.*

Invited Speaker; MR and MR Diffusion Imaging Findings in Schizophrenia, *Memory Disorders Center, Veterans Affairs Medical Center, Boston, MA.*

Invited Speaker; Diffusion Imaging as a Technique for Evaluating Disconnections in the Brain, *Memory Disorders Center, Veterans Affairs Medical Center, Boston, MA.*

Paper presented on Reduced Left Heschl's Gyrus Volume in Schizotypal Personality Disorder, *Biological Psychiatry, Chicago, IL.*

Paper presented on the Uncinate Fasciculus in Schizophrenia: A Diffusion Tensor Study, at the 153nd Annual Meeting of the American Psychiatric Association, Chicago, IL.

Paper presented on White Matter Abnormalities in Schizophrenia, at the 153nd Annual Meeting of the American Psychiatric Association, Chicago, IL.

Paper presented on Schizophrenia: Progressive Prefrontal Gray Matter Changes, at the 153nd Annual Meeting of the American Psychiatric Association, Chicago, IL.

Invited Speaker, Neuroimaging and Psychiatry, Seminar Series, Residency Training Program, Department of Psychiatry, VA Boston Healthcare System, Brockton Division, Harvard Medical School.

Paper presented on Uncinate fasciculus in schizophrenia: A diffusion tensor study, at the 153nd Annual Meeting of the American Psychiatric Association, Chicago, IL.

Paper presented on the Cingulum Bundle in Schizophrenia Using Diffusion Tensor Imaging, RSNA 86th Scientific Assembly and Annual Meeting, Chicago, IL.

2001 Paper presented on Disruption of the Integrity within the Cingulum Bundle in Schizophrenic Subjects: MR Diffusion Tensor Study, at the VIIth International Congress of Schizophrenia Research, Whistler's Mountain, British Columbia, Canada.

Paper presented on Fusiform Gyrus Volume Reduction in First-Episode Schizophrenia, at the 154th Annual Meeting of the American Psychiatric Association, Chicago, IL.

Paper presented on The Neurobiology of Schizotypal Personality Disorder, at Biological Psychiatry, New Orleans, LA.

Invited Speaker: Grand Rounds Presentation, The Neurobiology of Schizotypal Personality Disorder, Psychopharmacology Lecture Series, Massachusetts Mental Health Center, Department of Psychiatry, Harvard Medical School, Boston, MA.

2002 Invited Speaker; Grand Rounds Presentation, Neurophysiological, Neuroimaging, Cognitive, and Clinical Aspects of Schizotypal Personality Disorder, University of Massachusetts, Department of Psychiatry, Worcester, MA.

Workshop, How Does Studying Schizotypal Personality Disorder Inform Us About Schizophrenia? Biological Psychiatry, Philadelphia, PA.

Symposium, Post-Onset Progression of Gray and White Matter Abnormalities and Functional Changes in Schizophrenia. Biological Psychiatry, Philadelphia, PA.

Invited Speaker; Grand Rounds Presentation, The Neurobiology of Schizotypal Personality Disorder; Department of Psychiatry, Tufts University School of Medicine, Boston, MA.

2003 Invited Speaker; Grand Rounds Presentation, The Neurobiology of Schizotypal Personality Disorder; Department of Psychiatry, Dartmouth School of Medicine, Hanover, NH.

Invited Speaker; Career Opportunities in Academia, presentation to PGY-II and III Residents, Residency Training Program, Department of Psychiatry, Brockton-VAMC, Harvard Medical School.

- 2004 Invited Speaker; Grand Rounds Presentation, Cognitive, Event-Related Potential, and MRI Findings in Schizotypal Personality Disorder; *Neuroscience Series, Department of Psychiatry, Neurology, and Neurosurgery, Massachusetts General Hospital*, Harvard Medical School, Boston, MA.
- Paper presented on White matter integrity in schizophrenia- DTI and MTR voxel-wise analysis at the *Winter Workshop in Schizophrenia*, Davos, Switzerland.
- Paper presented in Symposium, Progressive decrease of superior temporal gyrus volume in first-episode schizophrenia; *2004 International Congress of Biological Psychiatry*, February 13, 2004, Sydney, Australia.
- Paper presented in Symposium, P300 ERP and MRI asymmetry in first episode schizophrenia; *2004 International Congress of Biological Psychiatry*, February 13, 2004, Sydney, Australia.
- Paper presented in Symposium, Mismatch negativity; a possible ERP and fMRI index of post onset progression of brain changes in schizophrenia. *2004 International Congress of Biological Psychiatry*, February 13, 2004, Sydney, Australia.
- Paper presented in Symposium, ERP and structural MR correlates of automatic and controlled attention in schizophrenia. *2004 International Congress of Biological Psychiatry*, February 13, 2004, Sydney, Australia.
- Invited Speaker; Schizotypal Personality Disorder; Developmental Neuroscience Course, *Harvard Child Psychiatry Training Program*, presentation to second year residents, Children's Hospital, Harvard Medical School.
- Invited Speaker; Grand Rounds Presentation entitled "Schizotypal Personality Disorder," *Braindance Awards for Student Research on Schizophrenia and the Brain*, The Schizophrenia Research Center and the Olin Neuropsychiatry Research Center at The Institute of Living, Hartford, CT, April 7, 2004.
- Invited Speaker, Symposium on The Midline as a Developmental Field and Its Relationship to Dysmorphogenesis in Psychotic Illness, presentation entitled "Midline Cavum Septi Pellucidi Abnormalities, Hippocampal Shape Abnormalities, and Diffusion Tensor Corpus Callosum Asymmetry Abnormalities in Schizophrenia." *XXIVth CINP Congress* (June 20-24, 2004), Palais des Congres, Porte Maillot, Paris, France, June 23, 2004.
- Paper presentation: DTI findings in schizophrenia. *DTI Workshop, New York Academy of Sciences*, New York, NY, August 29, 2004.
- Paper presented in Panel Session on Face to Face: Face Processing Health and Schizophrenia, the *43rd Annual Meeting of the American College of Neuropsychopharmacology*, Fusiform Gyrus Volume Reduction and Altered Face Processing in Schizophrenia, December, 2004, San Juan, Puerto Rico.
- 2005 Paper presented entitled *In Vivo* Neuroimaging Data in Support of Auditory Processing Abnormalities in Schizophrenia, at the Symposium on Top-Down versus Bottom-Up: The Role of Feedforward and Feedback in Auditory Processing Abnormalities in Schizophrenia, at the *60th Annual Meeting of Biological Psychiatry*, May 19, Atlanta, GA.
- Paper presented in Symposia on Understanding Anxiety: Advances in its Neurobiological Basis and Treatment Implications. Paper entitled: Structural and Functional and Neuroimaging Studies of PTSD. *The 8th World Congress of Biological Psychiatry*, June 30, 2005, Vienna, Austria.

Paper presented in Symposia on Bases for Change Detection vs. Controlled Attention: Thresholds of Consciousness in Schizophrenia. Paper entitled: MMN: A Probe for Auditory Cortex Abnormalities in Schizophrenia. *The 8th World Congress of Biological Psychiatry*, July 1, 2005, Vienna, Austria.

Paper presented in Symposia on Neurobiological Mechanisms Underlying Susceptibility to Schizophrenia. Paper entitled: Progressive MRI and ERP Deficits After Schizophrenia Onset. *The 8th World Congress of Biological Psychiatry*, June 30, 2005, Vienna, Austria.

Chair of Symposia on The Application of Diffusion Tensor Magnetic Resonance Imaging to Understand Brain Abnormalities in Schizophrenia. *The 8th World Congress of Biological Psychiatry*, July 2, 2005, Vienna, Austria.

Paper presented in Symposia on The Application of Diffusion Tensor Magnetic Resonance Imaging to Understand Brain Abnormalities in Schizophrenia. Paper entitled: Anatomical Disconnection in Schizophrenia: Evidence from Diffusion Tensor Imaging. *The 8th World Congress of Biological Psychiatry*, July 2, 2005, Vienna, Austria.

Invited speaker, *Iniciativa associada ao VIII Congresso Galaico Português de PsicoPedagogia*, University of Minho, Braga, Portugal, Neurobiology of Schizotypal Personality Disorder, July 5, 2005.

2006 Paper presented at *the 13th Biennial Winter Workshop on Schizophrenia Research*, Davos, Switzerland, as part of a session entitled “What separates brain structure in bipolar disorder from that in schizophrenia. Paper entitled: Neocortical gray matter volume in first episode schizophrenia and first episode affective psychosis: A cross-sectional and longitudinal MRI study. February 4, 2006.

Invited Speaker, Clinical Psychopharmacological Institute, *American Psychiatric Nurses Association*, Paper entitled: Neurobiology of Schizotypal Personality Disorder. June 24, 2006.

Paper presented at *Human Brain Mapping*, Florence, Italy, entitled: Executive attentional network-functional activation and anatomical integrity in schizophrenia, June 11-15, 2006.

Paper presented at *Human Brain Mapping*, Florence, Italy, entitled: Regionally specific orbitofrontal volume deficit and sulcal pattern alteration in schizophrenia and volumetric association with the Iowa Gambling Task, June 11-15, 2006.

Invited Speaker, *International Postgraduate Programme in Life and Health Sciences on Imaging in Neuropsychiatric Research*, University of Minho, Braga, Portugal, Diffusion Tensor Imaging Applied to Schizophrenia: A New Technique for Exploring White Matter Abnormalities, September 12, 2006, Braga, Portugal.

Invited Speaker, *International Postgraduate Programme in Life and Health Sciences on Imaging in Neuropsychiatric Research*, University of Minho, Braga, Portugal, ERP, MRI, DTI, and Cognitive Abnormalities in Schizotypal Personality Disorder, September 12, 2006.

Invited Speaker: “Neurobiology of schizotypal personality disorder, new findings”, Martinos Center for Biomedical Imaging, Department of Psychiatry, Massachusetts General Hospital, November 8, 2006, Boston, MA.

2007 Discussant for “DTI Update,” all hands meeting of the National Alliance for Medical Imaging and Computing, Salt Lake City, Utah, January 11, 2007.

Talk given to Residents in the Longwood Residency Training Program (PGY2) on “Neuroimaging Techniques Applied to Neuropsychiatric Disorders,” March 7, 2007, Boston, MA.

Talk given to Residents in the Longwood Residency Training Program (PGY2) on “Endophenotypic markers of psychiatric disorders: How to define a reasonable one,” March 14, 2007, Boston, MA.

Invited Speaker, “Longitudinal diffusion tensor imaging (DTI) of white matter changes in schizophrenia,” *International Congress of Schizophrenia Research*, Colorado Springs, CO, March 31, 2007.

Chair, Symposium on “Endophenotypic Markers in Schizophrenia,” *International Congress of Schizophrenia Research*, Colorado Springs, CO, March 30, 2007.

Invited speaker, Brigham and Women’s Hospital, Biomedical Research Institute, Imaging Program Seminar Series. “Neuroimaging Applications to Psychiatric Disorders,” June 5, 2007.

Invited Speaker, “DTI findings in schizophrenia”, Department of Psychiatry, University of Toronto School of Medicine, Toronto, Canada, June 19, 2007.

Oral Presentation, “Altered Orbitofrontal Sulcogyrual Pattern and Region-Specific Orbitofrontal Volume Deficit in Schizophrenia.” Presented at the *37th Annual Meeting of Society for Neuroscience*, November 4, 2007, San Diego, California.

Oral Presentation, “Altered Orbitofrontal Sulco-Gyral Pattern in Schizophrenia.” *International Congress on Schizophrenia Research*, March 30, 2007, Colorado Springs, Colorado.

2008 Oral Presentation, “Disease Specific Alteration of Orbitofrontal Sulcogyrual Pattern in First Episode Schizophrenia.” *1st Schizophrenia International Research Society Conference*, June 23, 2008, Venice, Italy.

Oral Presentation, “Neocortical Gray Matter Volume in First Episode Schizophrenia and First Episode Affective Psychosis: A Cross-sectional and Longitudinal MRI Study.” *3rd Annual Meeting of Japanese Society of Schizophrenia Research*, March 14, 2008, Tokyo, Japan.

Oral Presentation, “Altered Orbitofrontal Sulcogyrual Pattern and Region-Specific Orbitofrontal Volume Deficit in Schizophrenia.” *3rd Annual Meeting of Japanese Society of Schizophrenia Research*, March 14, 2008, Tokyo, Japan.

Oral Presentation, “Orbitofrontal Structural Alterations and Social Disturbance in Schizophrenia.” Symposium Presentation at 13th Pacific Rim College of Psychiatrists Scientific Meeting (PRCP), November 2, 2008, Tokyo, Japan.

Invited speaker, “MRI Findings in Schizophrenia,” *Program in Biomedical Neuroscience Distinguished Lecture Series*, Department of Pharmacology and Experimental Therapeutics, Boston University School of Medicine, January 18, 2008, Boston, MA.

Talk given to Residents in the *Longwood Residency Training Program in Psychiatry* (PGY2) “Neuroimaging Findings in Schizophrenia,” January 23, 2008, Boston, MA.

Invited speaker, “Diffusion Tensor Imaging Findings in Schizophrenia,” *Massachusetts Mental Health Center Research Grand Rounds*, Department of Psychiatry, Harvard Medical School, March 18, 2008.

Symposium: "Altered White Matter Communication in Schizophrenia and Bipolar Disorder: A Possible Common Endophenotype? Invited Speaker, "Uncinate Fasciculus and Cingulum bundle findings in First Episode Schizophrenia and First Episode Bipolar Disorder: A Diffusion Tensor Imaging Study." *16th European Congress of Psychiatry*, Nice, France, April 7, 2008.

Plenary Talk, *XI Turku PET Symposium: New Targets in Molecular Imaging*, "Advances in White Matter Imaging," May 27, 2008, Turku, Finland.

Invited speaker, "Diffusion Tensor Imaging in Schizophrenia," *Summer School course in Neuroscience at Harvard University*, Directed by Dr. Dorothy Holinger, July 10, 2008.

Plenary Speaker, "Advances in Diffusion Tensor Imaging in Schizophrenia," presented at the *Brain Imaging Symposium, New Concepts in Structural and Functional Imaging, IBILT-Faculdade de Medicina*, Amfiteatro, Center for Neuroscience and Cell Biology, University of Coimbra, Coimbra, Portugal, July 20, 2008.

Invited Speaker, "DTI Applications to Schizophrenia," Department of Psychology and Radiology, University of Minho, Braga, Portugal, July 21, 2008.

Chair and Invited Speaker, Symposium: Neuroimaging and Psychosis - Current Trends. Invited speaker on "Advances in white matter imaging in schizophrenia." *21st European College of Neuropsychopharmacology Congress* September 1, 2008, Barcelona, Spain.

Invited Speaker, "Advances in MRI and DTI Findings in Schizophrenia," *VA Boston Healthcare System/Harvard Grand Rounds*, Brockton, MA, October 1, 2008.

Invited Speaker, "MRI and DTI Findings in Schizophrenia," *Harvard Longwood Psychiatry Grand Rounds Conference*, Harvard Medical School Department of Psychiatry, October 30, 2008.

2009 Invited Speaker, "Research Careers in Psychiatry." Harvard Longwood Psychiatry Residency Training Program, February 25, 2009.

Invited Speaker, "Reviewing Research in the Area of Neuroimaging Findings in Neuropsychiatric Disorders," Harvard Longwood Psychiatry Residency Training Program, March 4, 2009.

Symposium on "New Advances in Diffusion Magnetic Resonance Imaging and Their Application to Schizophrenia. *World Psychiatric Association International Congress*, "Treatment in Psychiatry: A New Update." April 2, Florence, Italy.

Invited Speaker, Symposium on "Brain Imaging in Psychiatry: Recent Progress and Clinical Implications, "Advances in White Matter Imaging and its Application to Schizophrenia. *World Psychiatric Association International Congress*, "Treatment in Psychiatry: A New Update." April 3, Florence, Italy.

Oral Presentation, "Anterior cingulate and paracingulate abnormalities in schizophrenia." *Society for Neuroscience Meeting*, Chicago, IL, October 17-21, 2009.

Invited Speaker, "DTI Findings in Schizophrenia," School of Pharmacology, University of Rhode Island, Kingston, RI, November 12, 2009.

2010 Invited Speaker, "DTI as a method for understanding psychiatric disorders," PGY II residents, Harvard South Shore Psychiatry Residency Training Program, VA Brockton, Harvard Medical School, February 3, 2010.

Invited Speaker, "White Matter Findings in Schizophrenia and Related Disorders." Psychiatry Genetics and Translational Research Seminar, Department of Psychiatry, Massachusetts General Hospital, Boston, MA, March 9, 2010.

Speaker, External Advisory Board, Clinical Consortium for TBI and PTSD, "Progress in Neuroimaging Acquisition Protocols and Post-Processing Measures for the Clinical Consortium Sites." San Diego, CA, November 18, 2010.

2011 Invited Speaker, "Diagnostic and Prognostic Indicators of Traumatic Brain Injury." Exploring Diagnostic, Therapeutic, and Rehabilitative Strategies in NeuroHealth, TBI, and PTSD. *Center for Integration of Medicine and Innovative Technology* (CIMIT), Workshop, January 25, 2011.

Invited Speaker. "Neuroimaging applications for understanding psychiatric disorders," PGY II residents, Harvard South Shore Psychiatry Residency Training Program, VA Brockton, Harvard Medical School, March 7, 2011.

Invited Speaker, "In-Process Review of Neuroimaging Techniques and Their Application to the Multi-Site Clinical Consortium on PTSD/TBI." Presented at the US Army Medical Research and Materiel Command, Combat Casualty Care Research Program In-Process Scientific Review, Department of the Army, January 31, 2011, Herndon, VA.

Oral presentation, Diagnosis of Diffuse Axonal Injury with Diffusion Tensor Imaging, *3rd Federal Interagency Conference on TBI*, Washington DC, 2011.

Oral presentation, Diffusion Imaging Reveals Two Spatially Separable Mechanisms In Mild TBI. *3rd Federal Interagency Conference on TBI*, Washington, DC, 2011.

Invited Speaker, "White Matter Changes in First Episode Schizophrenia." Presented as part of a symposium on findings from the CIDAR first episode study of schizophrenia, entitled,

"Vulnerability to Progression in Schizophrenia." *International Congress of Schizophrenia Research*, Colorado Springs, CO, April 7, 2011.

Co-Chair, Poster Symposium on Multi-Modal Findings in Schizophrenia. *International Congress of Schizophrenia Research*, Colorado Springs, CO, April 5, 2011.

Invited Speaker, "On being a Mentor and Being Mentored." Special course on Moving on Up, Brigham and Women's Hospital, April 12, 2011.

Chair, Symposium entitled "A Multimodal Imaging Approach to Investigating the Structural Basis of Aberrant Brain Connectivity in Patients with Schizophrenia." 10th World Congress of the World Federation of Biological Psychiatry, June 1, 2011, Prague, Czech Republic.

Invited Facilitator, Break-Out Session on the Future of Neuroimaging in Psychiatry, Harvard Psychiatry Residents' Day, Imagining the Future of Psychiatry: Neuroscience to Healthcare Policy, McLean Hospital, November 9, 2011.

2012 Invited Speaker, "Neuroimaging and Psychiatry Disorders", PGY II Residents, Harvard South Shore Psychiatry Residency Training Program, VA Brockton, Harvard Medical School, January 18, 2012.

Invited Speaker, "Identification of Neuroinflammation in Mild Traumatic Brain Injury Using a Free Water Atlas, 9th World Congress on Brain Injury (IBIA), Edinburgh, Scotland, March 22, 2012.

Endowed Professorship Special Talk, "DTI findings in Schizophrenia and in Mild Traumatic Brain Injury", University of Minho, Minho, Portugal, April 18, 2012.

Symposium on Advanced Imaging in Psychiatric Diseases: Opportunities and Trends, invited talk on "Advanced Imaging for the Evaluation of Schizophrenia and Related Illnesses", 50th meeting of the *American Society for Neuroradiology*, New York, New York, April 21, 2012.

Invited Speaker, "Excessive Extracellular Volume Contributes to White Matter Abnormalities in the Early Stages of Schizophrenia", at the Centennial Celebration of Massachusetts Mental Health Center, Boston, MA, June 15, 2012.

Paper presented, "Estimation of Extracellular Volume from Regularized Multi-Shell Diffusion MRI. *MICCAI*, October 1-5, 2012, Nice, France.

Speaker at the first Conference on Chronic Traumatic Encephalopathy sponsored by the Cleveland Clinic Lou Ruvo Center for Brain Health and Boston University, "Role of Neuroimaging in CTE Detection: MRI, MRS, and Emerging PET Tau Imaging", October 1, 2012, Las Vegas, Nevada.

Speaker, External Advisory Board, Clinical Consortium for TBI and PTSD, "Progress in Neuroimaging Acquisition Protocols and Post-Processing Measures for the Clinical Consortium Sites." San Diego, CA, November 28, 2012.

2013

Invited Speaker, "Advanced Imaging in Mild TBI" at the 93rd *New England Roentegen Ray Society*, January 11, 2013, Boston, MA.

Invited Speaker, "Utilizing Advanced Neuroimaging to Provide Insights into Mild Traumatic Brain Injury and Repetitive Brain Trauma: DTI, MRS, and Emerging Pet Tau Imaging." *The 3rd Annual Traumatic Brain Injury Conference*, March 7, 2013, Washington, DC.

Invited Speaker, "Advances in Neuroimaging and Their Application to Schizophrenia and Mild Traumatic Brain Injury". Talk given to PGYII Residents in Psychiatry at the South Shore Residency Training Program in Psychiatry, Harvard Medical School. March 10, 2013.

Residency Training Program in Psychiatry, Harvard Medical School, VA Boston Healthcare System, March 13, 2013.

Invited Talk, "Application of Neuroimaging to Understand Schizophrenia and Mild Traumatic Brain Injury". Talk given to VISN Chief, Dr. Michael Mayo-Smith, March 13, 2013.

Invited Speaker, "Advanced Neuroimaging Techniques Applied to Schizophrenia, Mild Traumatic Brain Trauma, and Repetitive Brain Trauma". Neuroscience and Brain Seminar Series, Children's Hospital, Harvard Medical School, Boston, MA April 18, 2013.

Invited Speaker, "The Role of Neuroimaging in mTBI, Schizophrenia, and CTE: DTI, MRS, and Emerging PET Tau Imaging in CTE. BRAINMAP seminar series, Martinos Center, Charlestown Navy Yard, May 15, 2013.

Invited Speaker, "The role of advanced neuroimaging in mTBI and CTE: DTI, MRS, and Tau Imaging". Special Lectures of Recent Psychiatry Neuroimaging, Department of Neuropsychiatry, Kansai Medical University, Hotel Agora Osaka, Japan, June 24, 2013.

Chair (Co-Chair Dr. Marek Kubicki), Symposium, "New Developments in White Matter Imaging in Schizophrenia, Towards Understanding Pathology." 11th World Congress of Biological Psychiatry, June 27, 2013, Kyoto, Japan.

Invited Speaker, "The Role of Advanced Neuroimaging in CTE: DTI, MRS, and Emerging PET Tau Imaging", Brain Trauma-Related Neurodegeneration Workshop, sponsored by the National Institute of Neurological Disorders and Stroke (NINDS), August 12, 2013.

Speaker, "Perspectives on Challenges of Reproducibility and Variability in Diffusion MRI," part of workgroup on "Developing Standards for Diffusion Magnetic Resonance Imaging, a Meeting of Experts", sponsored by the *Institute of Medicine of The National Academies*. August 22, 2013.

Invited talk, "MR and Diffusion Tensor Imaging in Schizophrenia and in Mild Traumatic Brain Injury," Bouve College of Health Sciences, Northeastern University, December 2, 2013.

2014 TBI Neuroimaging Interim Progress Report, *Congressionally Designated Medical Research Program (CDMRP)*, "Tau Imaging in Chronic Encephalopathy," Fort Detrick, Maryland, January 31, 2014.

Invited talk, "Characterization of Acute Diffusion MRI Abnormalities following Concussion using a Joint Distribution Free-Water Imaging Normative Atlas." *International Brain Injury Association Tenth World Congress on Brain Injury (IBIA)*. March 2014. San Francisco, USA.

Invited talk, "Identification of Atrophy, Excitotoxicity and Gliosis in the White Matter of Retired NFL Players." *International Brain Injury Association Tenth World Congress on Brain Injury (IBIA)*. March 2014. San Francisco, USA.

Invited talk, "White matter microstructure and cortical thickness in former NFL players." *International Brain Injury Association Tenth World Congress on Brain Injury (IBIA)*. March 2014. San Francisco, USA.

Chair (Co-Chair with Dr. Robert Stern), Symposium on Chronic Traumatic Encephalopathy, "Advanced Neuroimaging in CE and Repetitive Concussive and Subconcussive Head Trauma" *International Brain Injury Association Tenth World Congress on Brain Injury (IBIA)*. March 2014. San Francisco, USA.

Invited talk, "Regional Metabolite Profiles in Chronic Sports-Related Concussion. *International Brain Injury Association Tenth World Congress on Brain Injury (IBIA)*. March 2014. San Francisco, USA.

Invited talk, "Diffusion Tensor Imaging in Mild Traumatic Brain Injury. *Vanderbilt University Medical Center-NICOE TBI Imaging Workshop*, August 29, 2014. Nashville, TN.

Report of Clinical Activities:

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| 1979-1984 | Research Fellow in Psychopathology, Psychology Laboratory, Mailman Research Center, McLean Hospital, Belmont MA, Harvard Medical School |
| 1982-1983 | Clinical Practicum/Clerkship, Psychology Department, McLean Hospital, Belmont MA, Harvard Medical School |
| 1984-1994 | Diagnostic evaluations at the Massachusetts Mental Health Center, then VA Boston Healthcare System, Brockton Division, Brockton MA, and McLean Hospital, Belmont, MA |
| 1985-1986 | Clinical Practicum/Clerkship, Psychology Department, Massachusetts Mental Health Center, Boston, MA, Harvard Medical School. |

Other:

- Summer 1995 Consultant for Drs. Jane Murphy and Alexander Leighton; performed SCID interviews for a Psychiatric Epidemiology Study in Atlantic Canada.
- 2001 *2001*: ESI Special Topics in Schizophrenia, ISI Thomson Scientific: Interview with Dr. Shenton. <http://esi-topics.com/schizophrenia/interviews/dr-martha-shenton.html>
- 2003 *2003*: Dr. Shenton's publication entitled, "Amygdala-hippocampal shape differences in schizophrenia: the application of 3D shape models to volumetric MR data", published in *Psychiatry Research*. 2002;1151-2:15-35, and her paper entitled, "Deformable organisms for automatic medical image analysis", published in *Med Image Analysis* 2002:Sept;6(3):251-266, were both selected for publication in the *2004 IMIA Yearbook of Medical Informatics: Towards Clinical Bioinformatics*, an overview of the most excellent, original, and state-of-the-art research in the area of Health and Medical Informatics over the past several years.
- 2007 *December 2007*: Dr. Shenton was featured in *The Scientist*, in a special supplement on schizophrenia. Read [article](#).
- Winter 2007*: Read [article](#) on the advances in schizophrenia research featured in [Brigham and Women's magazine](#).
- 2007*: [<http://www.esi-topics.com/schizophrenia/index.html>] provides information for the decade of the 90's (1981-1999) on schizophrenia research, where they review 19,506 papers, 24,088 authors, 101 countries, 1,139 journals, and 5,514 organizations, and report that Dr. Shenton's
- 2007*: 1992 *New England Journal of Medicine* is the 4th most cited paper out of 19,506, and she is the 14th most cited author out of 24,088 in the area of schizophrenia research.
- 2007*: This website also includes an interview with Dr. Shenton for ESI special Topics in Schizophrenia, ISI Thomson Scientific [<http://www.esi-topics.com/sch2007/index.html>]. New information from 1997 to 2007 on schizophrenia research is provided, where ESI reviews 13,989 papers, 26,117 authors, 99 countries, 947 journals, and 6,863 organizations and report that Dr.
- Shenton is the 8th most cited author out of 13,989 papers in the area of schizophrenia research [<http://www.esi-topics.com/sch2007/authors/b1a.html>].
- 2008 *2008*: Her paper, MRI Findings in Schizophrenia, published in *Schizophrenia Research* in 2001, is also among the top breaking papers listed in ESI [<http://www.esi-topics.com/fbp/comments/october02-MarthaShenton.html>].
- 2008*: In addition, Dr. Marek Kubicki, her close colleague, has an interview with ESI for having paper that is considered Fast Breaking because it is among the top 1% of papers cited over the last two years in the field of schizophrenia research [see <http://sciencewatch.com/dr/fbp/2008/08aprfb/08aprfbKubicki/>].
- 2008*: Dr. Shenton is also a co-author on the 10th most cited PTSD paper in the 1990's in the area of PTSD research, based on ISI Thomson Scientific, website: [<http://esi-topics.com/ptsd/index.html>].
- December 2008*: ScienceWatch lists Harvard University at the top of 20 institutions in Psychiatry and Psychology based on total citations to papers published in Thomson Reuters-indexed Psychiatry and Psychology journals. These institutions are the top 20 out of a pool of 360 institutions comprising the top 1% ranked by total citation count in this field. Dr. Shenton is mentioned as a [highly cited Harvard Author](#).

- 2009 *August 2009:* Science Watch: Top Citations for Institutions. Dr. Martha Shenton cited as among the top most cited researchers at Harvard: <http://sciencewatch.com/articles/most-cited-institutions-overall-1999-2009>
- 2010 *October 2010:* An article on how a different MRI technique used in [Dr. Shenton's](#) lab may help in diagnosing football-induced injuries appeared in *the Atlantic*. Read article [here](#).
- August 2010:* [Dr. Shenton](#) appears on History Channel's Stan Lee's Superhumans - Hammer Head episode where she discusses skull thickness of a man who drives spikes into boards with his head. View [episode](#).
- 2012 *February 2012:* [Psychiatry Newsletter Update](#) highlights traumatic brain injury studies in the Psychiatry Neuroimaging laboratory including Drs. [Martha Shenton](#), [Ofer Pasternak](#), and [Alex Lin](#).
- April 2012:* [Dr. Shenton's research paper](#) listed as the [seventh top most downloaded article in 2011](#).
November 2012: [Harvard Medicine News](#) featured Drs. [Martha Shenton](#), [Ross Zafonte](#), and [Joseph Giacino](#) in a piece describing the utility of [DTI](#) in characterization of mild [TBI](#).
- November 2012:* [Dr. Inga Koerte's](#) and senior author [Dr. Martha Shenton's JAMA paper](#) (see [Brigham & Women's Press Release](#) and [Ludwig-Maximilians-Universität](#)) garnered international attention, as it was the first original research to suggest that the sub-concussive hits experienced by elite soccer players are associated with alterations in white matter. Her work was featured in [TIME Magazine](#), [US News](#), [ABC News](#) (reposted from [MedPage Today \[see video\]](#)), [JAMA](#), [The Munich Eye](#), [Los Angeles Times](#), [Healthline](#), [ABC7Chicago](#), [Doctors Lounge](#), [The Week Magazine](#), [Harvard Medicine News](#), [Medical Daily](#), and [Elite Daily](#). See also: <http://healthhub.brighamandwomens.org/tag/martha-shenton>
- December 2012:* Led by first author [Dr. Inga Koerte's](#) and senior author [Dr. Martha Shenton](#), published findings on concussions and white matter integrity in hockey players in the [Journal of Neurosurgery \(full text\)](#). This high impact paper was covered in the [New York Times](#), [SlapShot \(New York Times featurette\)](#), [The Globe and Mail](#), [Vancouver Sun](#), and on [CJAD Talk Radio \(hear interview with Dr. Paul Echlin\)](#).
- 2013 *January 2013:* Commentary in Alzheimer's Forum: "In Former Footballers, MRI Links Cognitive Problems to Axon Damage": <http://www.alzforum.org/new/detail.asp?id=3375>
- January 2013:* Commentary in Alzheimer's Forum: comments on the recent study of tau neurofibrillary tangles in retired NFL players were published in [Alzheimer Research News](#).
- January 2013:* [Latitude News](#) featured [Dr. Inga Koerte](#) and [Dr. Ross Zafonte](#) in an article discussing the impact that brain trauma can have on white matter in the brain. Their research was also featured on [The Brigham and Women's Hospital Health Blog](#).
- March 2013:* In an interview with [Imaging in Medicine Journal](#), Dr. [Martha Shenton](#) discusses the PNL's role in pioneering the use of advanced MRI techniques in the study of schizophrenia and, more recently, mild Traumatic Brain Injury.
- March 2013:* In a recent publication in [Science Magazine](#), Dr. [Martha Shenton](#) describes the importance of new-sophisticated MRI techniques that can reveal microscopic damage to axons and brain lesions characteristic of mTBI.
- March 2013:* Drs. [Martha Shenton](#), [Inga Koerte](#) and [Ross Zafonte](#)'s high impact [JAMA paper](#) on sub-concussive hits experienced by soccer players was highlighted in "[Sueddeutsche Zeitung](#)", a high-profile newspaper in Germany; and in [Neurology Today](#).

April 2013: The BWH Psychiatry Neuroimaging Laboratory was this month's feature story in [BWH Clinical and Research News](#). The story highlights the diverse group of researchers at the PNL that are spearheading the use of state-of-the-art neuroimaging in TBI, schizophrenia and more.

2014

February 2014: PNL Study Finds Changes in Brains of Hockey Players Who Had ConcussionsA series of recently published papers in the [Journal of Neurosurgery](#) (Click for [Part 1](#), [Part 2](#), and [Part 3](#).) by Drs. [Martha Shenton](#), [Ofer Pasternak](#), [Inga Koerte](#), [Sylvain Bouix](#), [Takeshi Sasaki](#), [Marek Kubicki](#), [Peter Savadjiev](#), [Michael Mayinger](#), [Marc Muehlmann](#) and research assistant [Eli Fredman](#) has garnered international media attention and been featured in the [New York Times](#), [The Globe and Mail](#), [The Sports Network](#), [Fox News](#), and [The Calgary Herald](#). This was also featured in Brain and Behavior Research Foundation where Drs. Martha Shenton and Ofer Pasternak were featured as two NARSAD investigators, NARSAD Distinguished and Young Investigator, respectively (see [Brain and Behavior Research Foundation](#))

March 2014: Testimony before the United States House of Representatives, House Energy and Commerce Committee, Subcommittee on Commerce, Manufacturing, and Trade, at a hearing entitled "Improving Sports Safety: A Multifaceted Approach", Rayburn House Office Building, Washington, D.C., March 13, 2014, <http://www.c-span.org/video/?318281-1/hearing-improving-sports-safety> (Panel 2 begins at 1:44:49 and Dr. Shenton's testimony begins at 2:23:38)

May 2014: "Ban Heading in Youth Soccer", by Derrick Z. Jackson, Opinion in Sunday Boston Globe article where [Dr. Inga Koerte's](#) and [Dr. Martha Shenton](#) are cited for their research in reporting alterations in white matter in elite soccer players who have experienced subconcussive blows to the head but not concussion: <http://www.bostonglobe.com/opinion/2014/05/17/ban-heading-youth-soccer/F0jPt3oMlfajNfuphDFO8J/story.html> (see also above under November 2012, JAMA publication).

June 2014: List of Top 20 Articles, in the Domain of Article 20954428, since its publication (2010): <http://biomedupdater.com/>

July 28, 2014: VA HSR&D CYBERSEMINAR: Mild TBI Diagnosis and Management Strategies. Diffusion Tensor Imaging Findings in Mild Traumatic Brain Injury.
http://www.hsrdrd.research.va.gov/for_researchers/cyber_seminars/archives/video_archive.cfm?SessionID=867

September 6, 2014: AANS Neurosurgeon. Sports-Related mTBI: A Public Health Ethical Imperative Act.
<http://www.aansneurosurgeon.org/features/sport-related-mtbi-a-public-health-ethical-imperative-to-act/>

PART III: BIBLIOGRAPHY

Original Reports: (* = denotes past or present mentee/trainee) (**Google Scholar H-Index for all years = 88, since 2009 = 59; Web of Science H-Index = 69**)

1. Holzman PS, **Shenton ME**, and Solovay MR. Quality of thought disorder in differential diagnosis. *Schizophr Bull* 1986;12(3):360-371. PMID: [3764357](#) [full text]
2. Solovay MR, **Shenton ME**, *Gasperetti C, Coleman M, *Kestnbaum EJ, Carpenter JT, Holzman PS. Scoring manual for the thought disorder index. *Schizophr Bull* 1986;12(3):483-496. PMID: [3764364](#) [full text]
3. Solovay MR, **Shenton ME**, Holzman PS. Comparative studies of thought disorder: I. Mania and schizophrenia. *Arch Gen Psychiatry* 1987;44(1):13-20. PMID: [3800579](#)
4. **Shenton ME**, Solovay MR, Holzman PS. Comparative studies of thought disorder: II. Schizoaffective disorder. *Arch Gen Psychiatry* 1987;44(1):21-30. PMID: [3800580](#)
5. Faux SF, **Shenton ME**, McCarley RW, Torello MW, Duffy FH. P200 topographic alterations in schizophrenia: Evidence for left temporal-centrotemporal amplitude deficits. *Electroencephalogr and Clin Neurophysiol Suppl* 1987;40:681-687. PMID: [3480194](#)
6. Faux SF, Torello MW, McCarley RW, **Shenton ME**, Duffy FH. P300 topographic alterations in schizophrenia: A replication study. *Electroencephalogr and Clin Neurophysiol Suppl* 1987;40:688-694. PMID: [3480195](#)
7. *Daniels EK, **Shenton ME**, Holzman PS, Benowitz LI, Coleman, M, Levin S, Levine D. Patterns of thought disorder associated with right cortical damage, schizophrenia, and mania. *Am J Psychiatry* 1988;145(8):944-949. PMID: [3394878](#)
8. Faux SF, Torello MW, McCarley RW, **Shenton ME**, Duffy FH. P300 in schizophrenia: Confirmation and statistical validation of temporal region deficit in P300 topography. *Biol Psychiatry* 1988;23(8):776-790. PMID: [3365456](#)
9. Faux SF, **Shenton ME**, McCarley RW, Torello MW, Duffy FH. Differentiation of schizophrenics and normal controls is enhanced by the Goodin subtraction procedure. *Intern J Neuroscience* 1988;39(1-2):117-135. PMID: [3384564](#)
10. **Shenton ME**, Faux SF, McCarley RW, *Ballinger R, Coleman M, Torello MW, Duffy FH. Correlations between abnormal auditory P300 topography and positive symptoms in schizophrenia: A preliminary report. *Biol Psychiatry* 1989;25(6):710-716. PMID: [2923933](#)
11. **Shenton ME**, *Ballinger R, *Marcy B, Faux SF, *Cane M, LeMay M, Cassens G, Coleman M, Duffy FH, McCarley RW. Two Syndromes of schizophrenic psychopathology associated with left vs. right temporal deficits in P300 amplitude: Four case reports. *J Nerv Ment Dis* 1989;177(4):219-225. PMID: [2564883](#)
12. **Shenton ME**, Solovay MR, Holzman PS, Coleman M, Gale HJ. Thought-disorder in the relatives of psychotic patients. *Arch Gen Psychiatry* 1989;46(10):897-901. PMID: [2489936](#)
13. **Shenton ME**, Faux SF, McCarley RW, *Ballinger R, Coleman M, Duffy FH. Clinical correlations of auditory P200 topography and left temporo-central deficits in schizophrenia: A preliminary study. *J Psychiatric Res* 1989;23(1):13-34. PMID: [2754626](#)
14. McCarley RW, Faux SF, **Shenton ME**, LeMay M, *Cane M, *Ballinger R, Duffy FH. CT abnormalities in schizophrenia: A preliminary study of their correlations with P300/P200 electrophysiological features and positive/negative symptoms. *Arch Gen Psychiatry* 1989;46(8):698-708. PMID: [2751404](#)

15. Faux SF, **Shenton ME**, McCarley RW, Nestor PG, *Marcy B, *Ludwig A. Preservation of P300 event-related potential topographic asymmetries in schizophrenia with use of either linked-ears or nose reference sites. *Electroencephalogr and Clin Neurophysiol* 1990;75(5):378-391. PMID: [1692273](#)
16. Nestor PG, Faux SF, McCarley RW, **Shenton ME**, Sands SF. Measurement of visual sustained attention in schizophrenia using signal detection analysis and a newly developed computerized CPT task. *Schizophr Res* 1990;3(5-6):329-332. PMID: [2282338](#)
17. McCarley RW, Faux SF, **Shenton ME**, Nestor PG, Adams J. Event-related potentials in schizophrenia: Their biological and clinical correlates and a new model of schizophrenic pathophysiology. *Schizophr Res* 1991;4(2):209-231. PMID: [2039762](#)
18. **Shenton ME**, Kikinis R, McCarley RW, Metcalf D, Tieman J, Jolesz FA. Application of automated MRI volumetric measurement techniques to the ventricular system in schizophrenics and normals. *Schizophr Res* 1991;5(2):103-113. PMID: [1931803](#)
19. McCarley RW, Faux SF, **Shenton ME**, Nestor PG, *Holinger DP. Is there P300 asymmetry in schizophrenia? *Arch Gen Psychiatry* 1991;48(4):380-383. [Letter to the editor]. PMID: [2009038](#)
20. **Shenton ME**, Holzman PS, Gale HJ, Solovay MR, Coleman M. Distinguishing between content and form of speech – Reply. *Arch Gen Psychiatry* 1991;48:281-282. [Letter to the editor].
21. **Shenton ME**, Kikinis R, Jolesz FA, *Pollak SD, LeMay M, Wible CG, *Hokama H, Martin J, Metcalf D, Coleman M, McCarley RW. Abnormalities of the left temporal-lobe and thought-disorder in schizophrenia – A quantitative magnetic-resonance-imaging study. *N Engl J Med* 1992;327(9):604-612. PMID: [1640954](#) [full text] [ESI Thomson Scientific-rated as 4th most cited paper in schizophrenia, from more than 24,000 authors and 19,000 papers, in the decade of the 1990's (<http://www.esi-topics.com/schizophrenia/index.html>).]
22. **Shenton ME**, Solovay MR, Holzman PS, Gale HJ, Coleman M. Thought disorders ratings distinguish between diagnostic groups- Reply. *Arch Gen Psychiatry* 1992;49:590-590. [Letter to the editor].
23. **Shenton ME**, Kikinis R, McCarley RW. Abnormalities of the left temporal lobe in schizophrenia – Reply to Roth, Pfefferbaum and to Klimke and Knecht. *N Engl J Med* 1992;327(23):1690-1690. [Letter to the editor].
24. Gerig G, Martin J, Kikinis R, Kübler O, **Shenton ME**, Jolesz FA. Unsupervised tissue-type segmentation of 3D dual-echo MR head data. *Image and Vision Computing* 1992;10(6):349-360.
25. Kikinis R, **Shenton ME**, Gerig G, Martin J, Anderson M, Metcalf D, Guttman CRG, McCarley RW, Lorensen W, Cline H, Jolesz FA. Routine quantitative-analysis of brain and cerebrospinal-fluid spaces with MR imaging. *J Mag Res Imaging* 1992;2(6):619-629. PMID: [1446105](#)
26. Nestor PG, Faux SF, McCarley RW, *Penhune V, **Shenton ME**, *Pollak SD, Sands SF. Attentional cues in chronic schizophrenia: Abnormal disengagement of attention. *J Ab Psych* 1992;101(4):682-689. PMID: [1430608](#)
27. *Holinger DP, Faux SF, **Shenton ME**, *Sokol NS, Seidman LH, Green AI, McCarley RW. Reversed temporal region asymmetries of P300 topography in left-handed and right-handed schizophrenic subjects. *Electroencephalogr Clin Neurophysiol* 1992;84(6):532-537. PMID: [1280199](#)
28. Faux SF, McCarley RW, Nestor PG, **Shenton ME**, *Pollak SD, *Penhune V, *Mondrow E, *Marcy B, Peterson A, Horvath T, Davis KL. P300 topographic asymmetries are present in unmedicated schizophrenics. *Electroencephalogr and Clin Neurophysiol* 1993;88(1):32-41. PMID: [7681389](#)

29. McCarley RW, **Shenton ME**, O'Donnell BF, Faux SF, Kikinis R, Nestor PG, Jolesz FA. Auditory P300 abnormalities and left posterior superior temporal gyrus volume reduction in schizophrenia. *Arch Gen Psychiatry* 1993;50(3):190-197. PMID: [8439239](#)
30. McCarley RW, **Shenton ME**, O'Donnell BF, Nestor PG. Uniting Kraepelin and Bleuler – The psychology of schizophrenia and the biology of temporal-lobe abnormalities. *Harv Rev Psychiatry* 1993;1(1):36-56. PMID: [9384826](#)
31. O'Donnell BF, **Shenton ME**, McCarley RW, Faux SF, *Smith RS, *Salisbury DF, Nestor PG, *Pollak SD, Kikinis R, Jolesz FA. The auditory N2 component in schizophrenia – Relationship to MRI temporal-lobe gray-matter and to other ERP abnormalities. *Biol Psychiatry* 1993;34(1-2):26-40. PMID: [8373937](#)
32. **Shenton ME**, O'Donnell BF, Nestor PG, Wible CG, Kikinis R, Faux SF, *Pollak SD, Jolesz FA, McCarley RW. Temporal-lobe abnormalities in a patient with schizophrenia who has word-finding difficulty – Use of high-resolution magnetic-resonance-imaging and auditory P300 event-related potentials. *Harv Rev Psychiatry* 1993;1(2):110-117. PMID: [9384837](#)
33. Coleman MJ, Carpenter JT, Waternaux C, Levy DL, **Shenton ME**, Perry J, Medoff D, Wong H, Monoach D, Meyer P, O'Brian C, Valentino C, Robinson D, Smith M, Makowski D, Holzman PS. The thought disorder index: A reliability study. *Psychological Assessment: A Journal of Consulting and Clinical Psychology* 1993;3(3):336-342.
34. Adams J, Faux SF, Nestor PG, **Shenton ME**, *Marcy B, *Smith RS, McCarley RW. ERP abnormalities during semantic processing in schizophrenia. *Schizophr Res* 1993;10(3):247-257. PMCID: [PMC2864521](#)
35. Nestor PG, **Shenton ME**, McCarley RW, *Haimson J, *Smith RS, O'Donnell BF, *Kimble M, Kikinis R, Jolesz FA. Neuropsychological correlates of MRI temporal-lobe abnormalities in schizophrenia. *Am J Psychiatry* 1993;150(12):1849-1855. PMID: [8238641](#)
36. O'Donnell BF, Cohen RA, *Hokama H, Cuffin BN, Lippa C, **Shenton ME**, Drachman DA. Electrical source analysis of auditory ERPs in medial temporal-lobe amnestic syndrome. *Electroencephalogr and Clin Neurophysiol* 1993;87(6):394-402. PMID: [7508372](#)
37. *Levitt J, **Shenton ME**, McCarley RW, Faux SF, *Ludwig AS. Premorbid adjustment in schizophrenia – Implications for psychosocial and ventricular pathology. *Schizophr Res* 1994;12(2):159-168. PMID: [8043526](#)
38. O'Donnell BF, *Hokama H, McCarley RW, *Smith RS, *Salisbury DF, *Mondrow E, Nestor PG, **Shenton ME**. Auditory ERPs to nontarget stimuli in schizophrenia – Relationship to probability, task-demands, and target ERPs. *Intern J Psychophysiol* 1994;17(3):219-231. PMID: [7806466](#)
39. Kikinis R, **Shenton ME**, Gerig G, *Hokama H, *Haimson J, O'Donnell BF, Wible CG, McCarley RW, Jolesz FA. Temporal-lobe sulco-gyrus pattern anomalies in schizophrenia – An in-vivo MR 3-dimensional surface rendering study. *Neuroscience Letters* 1994;182(1):7-12. PMID: [7891892](#)
40. McCarley RW, **Shenton ME**, O'Donnell BF, Nestor PG. Neural circuits in schizophrenia. *Arch Gen Psychiatry* 1994;51(7):515-516. [Letter to the Editor]. PMID: [8031223](#)
41. *Salisbury DF, O'Donnell BF, McCarley RW, **Shenton ME**, Benavage A. The N2 event-related potential reflects attention-deficit in schizophrenia. *Biol Psychology* 1994;39(1):1-13. PMID: [7880944](#)
42. Wible CG, **Shenton ME**, *Hokama H, Kikinis R, Jolesz FA, Metcalf D, McCarley RW. Prefrontal cortex and schizophrenia – A quantitative magnetic-resonance-imaging study. *Arch Gen Psychiatry* 1995;52(4):279-288. PMID: [7702444](#)

43. O'Donnell BF, Faux SF, McCarley RW, *Kimble MO, *Salisbury DF, Nestor PG, Kikinis R, Jolesz FA, **Shenton ME**. Increased rate of P300 latency prolongation with age in schizophrenia – Electrophysiological evidence for a neurodegenerative process. *Arch Gen Psychiatry* 1995;52(7):544-549. PMID: [7598630](#)
44. O'Donnell BF, **Shenton ME**, McCarley RW, Faux SF, Kikinis R, Nestor PG, Jolesz FA. Conjoint left asymmetry of auditory P300 voltage and MRI volume of posterior superior temporal gyrus in schizophrenia: A quantitative evaluation. *Electroencephalogr Clin Neurophysiol Suppl* 1995;44:387-397. PMID: [7649048](#)
45. **Shenton ME**, Kikinis R, McCarley RW, Saiviroonporn P, *Hokama HH, Robatino A, Metcalf D, Wible CG, *Portas CM, *Iosifescu DV, *Donnino R, *Goldstein JM, Jolesz FA. Harvard brain atlas: A teaching and visualization tool. *IEEE Biomedical Visualization* 1995;10-17.
46. **Shenton ME**, McCarley RW, Tamminga CA. Cortex, IX: Heschl's gyrus and the planum temporale. *Am J Psychiatry* 1995;152(7):966-996. PMID: [7793465](#)
47. Nestor PG, **Shenton ME**, O'Donnell BF, McCarley RW, Wible C. Association between cognitive deficits and temporal-lobe abnormalities – Reply. *Am J Psychiatry* 1995;152(3):475-476. [Letter to the editor.]
48. *Hokama H, **Shenton ME**, Nestor PG, Kikinis R, *Levitt JJ, Metcalf D, Wible CG, O'Donnell BF, Jolesz FA, McCarley RW. Caudate, putamen, and globus pallidus volume in schizophrenia: A quantitative MRI study. *Psychiatr Res: Neuroimaging* 1995;61(4):209-229. PMID: [8748466](#)
49. Sanders LM, Adams J, Tager-Flusberg H, **Shenton ME**, Coleman M. A comparison of clinical and linguistic indexes of deviance in the verbal discourse of schizophrenics. *Applied Psycholinguistics* 1995;16(3):325-338.
50. O'Donnell BF, Swearer JM, *Smith LT, Nestor PG, **Shenton ME**, McCarley RW. Selective deficits in visual perception and recognition in schizophrenia. *Am J Psychiatry* 1996;153(5):687-692. PMID: [8615416](#)
51. Ettinger GJ, Grimson WEL, Leventon ME, Kikinis R, Gugino V, Cote W, *Karapelou M, Aglio L, **Shenton ME**, *Potts G, Alexander E. Non-invasive functional brain mapping using registered transcranial magnetic stimulation. *IEEE Mathematical Methods in Biomedical Image Analysis* 1996;32-41. [[full text](#)]
52. Naf M, Kübler O, Kikinis R, **Shenton ME**, Székely G. Characterization and recognition of 3D organ shapes in medical image analysis using skeletonization. *IEEE Mathematical Methods in Biomedical Image Analysis* 1996;139-150.
53. Kikinis R, **Shenton ME**, *Iosifescu DV, McCarley RW, Saiviroonporn P, *Hokama HH, Robatino A, Metcalf D, Wible CG, *Portas CM, *Donnino RM, Jolesz FA. A digital brain atlas for surgical planning, model-driven segmentation, and teaching. *IEEE Transactions on Visualization and Computer Graphics* 1996;2(3):232-241. [[full text](#)]
54. *Levitt JJ, O'Donnell BF, McCarley RW, Nestor PG, **Shenton ME**. Correlations of premorbid adjustment in schizophrenia with auditory event-related potential and neuropsychological abnormalities. *Am J Psychiatry* 1996;153(10):1347-1349. PMID: [8831448](#)
55. Gurvits TV, **Shenton ME**, *Hokama H, *Ohta H, Lasko NB, Gilbertson MW, Orr SP, Kikinis R, Jolesz FA, McCarley RW, Pitman RK. Magnetic resonance imaging study of hippocampal volume in chronic, combat-related post-traumatic stress disorder. *Biol Psychiatry* 1996;40(11):1091-1099. PMCID: [PMC2910907](#) [ESI Thomson Scientific-rated as 10th most cited PTSD paper in the 1990's in PTSD research, (<http://esi-topics.com/ptsd/papers/a1.html>).]
56. *Niznikiewicz MA, O'Donnell BF, Nestor PG, *Smith L, *Law S, *Karapelou M, **Shenton ME**, McCarley RW. ERP assessment of visual and auditory language processing in schizophrenia. *J Ab Psych* 1997;106(1):85-94. PMID: [9103720](#)

57. Nestor PG, *Kimble MO, O'Donnell BF, *Smith L, *Niznikiewicz M, **Shenton ME**, McCarley RW. Aberrant semantic activation in schizophrenia: A neurophysiological study. *Am J Psychiatry* 1997;154(5):640-646. PMID: [9137119](#)
58. Náf M, Székely G, Kikinis R, **Shenton ME**, Kübler O. 3D voronoi skeletons and their usage for the characterization and recognition of 3D organ shape. *Computer Vision and Image Understanding* 1997;66(2):147-161. [[full text](#)]
59. *Iosifescu DV, **Shenton ME**, Warfield SK, Kikinis R, Dengler J, Jolesz FA, McCarley RW. An automated registration algorithm for measuring MRI subcortical brain structures. *NeuroImage* 1997;6(1):13-25. PMID: [9245652](#)
60. Wible CG, **Shenton ME**, *Fischer IA, *Allard JE, Kikinis R, Jolesz FA, *Iosifescu DV, McCarley RW. Parcellation of the human prefrontal cortex using MRI. *Psychiatr Res: Neuroimaging* 1997;76(1):29-40. PMID: [9498307](#)
61. McCarley RW, O'Donnell BF, *Niznikiewicz MA, *Salisbury DF, *Potts GF, *Hirayasu Y, Nestor PG, **Shenton ME**. Update on electrophysiology in schizophrenia. *Intern Rev Psychiatry* 1997;9(4):373-386.
62. O'Donnell BF, Swearer JM, Nestor PG, **Shenton ME**, McCarley RW. Selective deficits in visual perception and recognition in schizophrenia: Reply. *Am J Psychiatry* 1997;154:585-587. [Letter to the Editor].
63. *Salisbury DF, **Shenton ME**, *Sherwood A, *Fischer IA, Yurgelun-Todd D, Tohen M, McCarley RW. First episode schizophrenia psychosis differs from first-episode affective psychosis and controls in P300 amplitude over left temporal lobe. *Arch Gen Psychiatry* 1998;55(2):173-180. PMCID: [PMC2730913](#)
64. Nestor PG, **Shenton ME**, Wible CG, *Hokama H, O'Donnell BG, *Law S, McCarley RW. A neuropsychological analysis of schizophrenic thought disorder. *Schizophr Res* 1998;29(3):217-225. PMID: [9516662](#)
65. Nestor PG, *Akdag SJ, O'Donnell BF, *Niznikiewicz M, *Law S, **Shenton ME**, McCarley RW. Word recall in schizophrenia: A connectionist model. *Am J Psychiatry* 1998;155(12):1685-1690. PMID: [9842776](#)
66. *Portas CM, *Goldstein JM, **Shenton ME**, *Hokama HH, Wible CG, *Fischer I, Kikinis R, *Donnino R, Jolesz FA, McCarley RW. Volumetric evaluation of the thalamus in schizophrenic male patients using magnetic resonance imaging. *Biol Psychiatry* 1998;43(9):649-659. PMID: [9582998](#)
67. *Kwon JS, **Shenton ME**, *Hirayasu Y, *Salisbury DF, *Fischer IA, *Dickey CC, Yurgelun-Todd D, Tohen M, Kikinis R, Jolesz FA, McCarley RW. MRI study of cavum septi pellucidi in schizophrenia, affective disorder, and schizotypal personality disorder. *Am J Psychiatry* 1998;155(4):509-515. PMCID: [PMC2826366](#)
68. *Anderson JE, O'Donnell BF, McCarley RW, **Shenton ME**. Progressive changes in schizophrenia: Do they exist and what do they mean? *Restor Neurol Neurosci* 1998;12(2-3):175-184. PMID: [12671313](#)
69. *Anderson JE, Umans CM, Halle M, Golland P, Jakab M, McCarley RW, Jolesz FA, **Shenton ME**, Kikinis R. Anatomy browser: Java-based interactive teaching tool for learning human neuroanatomy. *RSNA Electronic Journal* 1998;2:50-97. (Serial online) (<http://ej.rsna.org/ej2/0050-97.fin/index.html>)
70. *Potts GF, Gugino LD, Leventon ME, Grimson WE, Kikinis R, Cote W, Alexander E, *Anderson JE, Ettinger GJ, Aglio LS, **Shenton ME**. Visual hemifield mapping using transcranial magnetic stimulation coregistered with cortical surfaces derived from magnetic resonance images. *J Clin Neurophysiology* 1998;15(4):344-350. PMID: [9736468](#)
71. *Hirayasu Y, **Shenton ME**, *Salisbury DF, *Dickey CC, *Fischer IA, *Mazzoni P, *Kisler T, *Arakaki H, *Kwon JS, *Anderson JE, Yurgelun-Todd D, Tohen M, McCarley RW. Lower left temporal lobe MRI volumes in

patients with first-episode schizophrenia compared with psychotic patients with first-episode affective disorder and normal subjects. *Am J Psychiatry* 1998;155(10):1384-1391. PMID: [9766770](#) [full text]

72. *Potts GF, *Hirayasu Y, O'Donnell BF, **Shenton ME**, McCarley RW. High-density recording and topographic analysis of the auditory oddball event-related potential in schizophrenia. *Biol Psychiatry* 1998;44(10):982-989. PMID: [9821562](#)
73. *Hirayasu Y, *Potts GF, O'Donnell BF, *Kwon JS, *Arakaki H, *Akdag SJ, *Levitt JJ, **Shenton ME**, McCarley RW. Auditory mismatch negativity in schizophrenia: Topographic evaluation with a high density recording montage. *Am J Psychiatry* 1998;155(9):1281-1284. PMID: [9734556](#) [full text]
74. Ettinger GJ, Leventon ME, Grimson WE, Kikinis R, Gugino L, Cote W, Sprung L, Aglio L, **Shenton ME**, *Potts G, Hernandez VL, Alexander E. Experimentation with a transcranial magnetic stimulation system for functional brain mapping. *Med Image Analysis* 1998;2(2):133-142. PMID: [10646759](#) [full text]
75. *Salisbury DF, **Shenton ME**, McCarley RW. P300 topography differs in schizophrenia and manic psychosis. *Biol Psychiatry* 1999;45(1):98-106. PMID: [9894581](#)
76. *Kwon JS, McCarley RW, *Hirayasu Y, *Anderson JE, *Fischer IA, Kikinis R, Jolesz FA, **Shenton ME**. Left planum temporale volume reduction in schizophrenia. *Arch Gen Psychiatry* 1999;56(2):142-148. PMID: [10025438](#) [full text]
77. McCarley RW, Wible CG, *Frumin M, *Hirayasu Y, *Levitt JJ, *Fischer IA, **Shenton ME**. MRI anatomy of schizophrenia. *Biological Psychiatry* 1999;45(9):1099-1119. PMCID: [PMC2846838](#)
78. *Dickey CC, McCarley RW, Voglmaier MM, *Niznikiewicz MA, Seidman LJ, *Hirayasu Y, *Fischer IA, *Teh EK, *Van Rhoads R, Jakab M, Kikinis R, Jolesz FA, **Shenton ME**. Schizotypal personality disorder and MRI abnormalities of temporal lobe gray matter. *Biol Psychiatry* 1999;45(11):1393-1402. PMCID: [PMC2832794](#)
79. *Hirayasu Y, **Shenton ME**, *Salisbury DF, *Kwon JS, Wible CG, *Fischer IA, Yurgelun-Todd D, Zarate C, Kikinis R, Jolesz FA, McCarley RW. Subgenual cingulate cortex volume in first episode psychosis. *Am J Psychiatry* 1999;156(7):1091-1093. PMCID: [PMC2845843](#)
80. *Niznikiewicz MA, Voglmaier MM, **Shenton ME**, Seidman LJ, *Dickey CC, *Rhoads, R, *Teh E, McCarley RW. Electrophysiological correlates of language processing in schizotypal personality disorder. *Am J Psychiatry* 1999;156(7):1052-1058. PMCID: [PMC2848255](#)
81. *Levitt JJ, McCarley RW, Nestor PG, *Petrescu C, *Donnino R, *Hirayasu Y, Kikinis R, Jolesz FA, **Shenton ME**. Quantitative volumetric MRI study of the cerebellum and vermis in schizophrenia: Clinical and cognitive correlates. *Am J Psychiatry* 1999;156(7):1105-1107. PMCID: [PMC2845842](#)
82. O'Donnell BF, McCarley RW, *Potts GF, *Salisbury DF, Nestor PG, *Hirayasu Y, *Niznikiewicz MA, Barnard J, Shen ZJ, Weinstein DM, Bookstein F, **Shenton ME**. Identification of neural circuits underlying P300 abnormalities in schizophrenia. *Psychophysiology* 1999;36(3):388-398. PMCID: [PMC2850060](#)
83. *Salisbury DF, O'Donnell BF, Nestor PG, **Shenton ME**, McCarley RW. Multimodal imaging in psychiatry: The electroencephalogram as a complement to other modalities. *CNS Spectrums* 1999;4:44-57. PMID: [17921930](#)
84. *Kwon JS, O'Donnell BF, Wallenstein GV, Greene RW, *Hirayasu Y, Nestor PG, Hasselmo ME, *Potts GF, **Shenton ME**, McCarley RW. Gamma frequency-range abnormalities to auditory stimulation in schizophrenia. *Arch Gen Psychiatry* 1999;56(11):1001-1005. PMCID: [PMC2863027](#)
85. *Holinger DP, **Shenton ME**, Wible CG, *Donnino R, Kikinis R, Jolesz FA, McCarley RW. Superior temporal gyrus volume abnormalities and thought disorder in left-handed schizophrenic men. *Am J Psychiatry* 1999;156(11):1730-1735. PMCID: [PMC2845841](#)

86. McCarley RW, *Niznikiewicz MA, *Salisbury DF, Nestor PG, O'Donnell BF, *Hirayasu Y, Grunze H, Greene RW, **Shenton ME**. Cognitive dysfunction in schizophrenia: unifying basic research and clinical aspects. *Eur Arch Psychiatry Clin Neurosci* 1999;249(suppl.4):69-82.
87. Golland P, Kikinis R, Halle M, Umans C, Grimson WE, **Shenton ME**, Richolt JA. Anatomy browser: A novel approach to visualization and integration of medical information. *Comput Aided Surg* 1999;4(3):129-143. PMID: [10528270](#)
88. Nestor PG, O'Donnell BF, *Niznikiewicz MA, **Shenton ME**, McCarley RW. Neuromodulation of attention in schizophrenia. *Psychiatric Annals* 1999;29:633-640. [[full text](#)]
89. *Dickey CC, **Shenton ME**, *Hirayasu Y, *Fischer IA, Voglmaier MM, *Niznikiewicz MA, Seidman LJ, *Fraone S, McCarley RW. Large CSF volume not attributable to ventricular volume in schizotypal personality disorder. *Am J Psychiatry* 2000;157(1):48-54. PMCID: [PMC2832789](#)
90. *Niznikiewicz MA, *Donnino R, McCarley RW, Nestor PG, *Iosifescu DV, O'Donnell BF, *Levitt JJ, **Shenton ME**. Abnormal angular gyrus asymmetry in schizophrenia. *Am J Psychiatry* 2000;157(3):428-437. PMCID: [PMC2846293](#)
91. *Niznikiewicz MA, Voglmaier M, **Shenton ME**, *Dickey CC, Seidman LJ, *Teh E, *Van Rhoads R, McCarley RW. Lateralized P3 deficit in schizotypal personality disorder. *Biol Psychiatry* 2000;48(7):702-705. PMCID: [PMC2845845](#)
92. Farmer CM, O'Donnell BF, *Niznikiewicz MA, Voglmaier MM, McCarley RW, **Shenton ME**. Visual perception and working memory in schizotypal personality disorder. *Am J Psychiatry* 2000;157(5):781-788. PMCID: [PMC2845849](#)
93. Voglmaier MM, Seidman LJ, *Niznikiewicz MA, *Dickey CC, **Shenton ME**, McCarley RW. Verbal and nonverbal neuropsychological test performance in subjects with schizotypal personality disorder. *Am J Psychiatry* 2000;157(5):787-793. PMCID: [PMC2845850](#)
94. *Hirayasu Y, **Shenton ME**, *Salisbury DF, McCarley RW. Hippocampus and superior temporal gyrus volume in first-episode schizophrenia. *Arch Gen Psychiatry* 2000;57(6):618-618. [Letter to the editor]. PMID: [10839342](#)
95. *Hirayasu Y, McCarley RW, *Salisbury DF, *Tanaka S, *Kwon JS, *Frumkin M, *Synderman D, Yurgelun-Todd D, Kikinis R, Jolesz FA, **Shenton ME**. Planum temporale and Heschl gyrus volume reduction in schizophrenia – A MRI study of first-episode patients. *Arch Gen Psychiatry* 2000;57(7):692-699. PMCID: [PMC2850271](#)
96. *Salisbury DF, O'Donnell BF, McCarley RW, Nestor PG, **Shenton ME**. Event-related potentials elicited during a context-free homograph task in normal versus schizophrenic subjects. *Psychophysiology* 2000;37(4):456-463. PMCID: [PMC2646500](#)
97. *Zahajsky J, *Dickey CC, McCarley RW, *Fischer IA, Nestor PG, Kikinis R, **Shenton ME**. A quantitative MR measure of the fornix in schizophrenia. *Schizophr Res* 2001;47(1):87-97. PMCID: [PMC2845160](#)
98. **Shenton ME**, *Dickey CC, *Frumkin M, McCarley RW. A review of MRI findings in schizophrenia. *Schizophr Res* 2001;49(1-2):1-52. PMCID: [PMC2812015](#) [ESI Thomson Scientific, rated as one of the top 1% of fast breaking papers in the field of schizophrenia research: (<http://www.esi-topics.com/fbp/comments/october02-MarthaShenton.html>)]
99. McCarley RW, Wible CG, *Frumkin M, *Hirayasu Y, *Levitt JJ, **Shenton ME**. Why vote-count reviews don't count. *Biol Psychiatry* 2001;49:161-163. [Letter to the Editor.] [[full text](#)]

100. *Hirayasu Y, *Tanaka S, **Shenton ME**, *Salisbury DF, DeSantis MA, *Levitt JJ, Wible CG, Yurgelun-Todd D, Kikinis R, Jolesz FA, McCarley RW. Prefrontal gray matter volume reduction in first episode schizophrenia. *Cereb Cortex* 2001;11(4):374-381. PMID: [11278200](#) [full text]
101. Wible CG, *Kubicki M, Yoo S-S, Kacher DF, *Salisbury DF, Anderson MC, **Shenton ME**, *Hirayasu Y, Kikinis R, Jolesz FA, McCarley RW. A functional magnetic resonance imaging study of auditory mismatch in schizophrenia. *Am J Psychiatry* 2001;158(6):938-943. PMCID: [PMC2845157](#)
102. *Salisbury DF, Rutherford B, **Shenton ME**, McCarley RW. Button-pressing affects P300 amplitude and scalp topography. *Clin Neurophysiology* 2001;112(9):1676-1684. PMCID: [PMC2650488](#)
103. Bonne O, Brandes D, Gilboa A, Gomori J, **Shenton ME**, Pitman RK, Shalev AY. Longitudinal MRI study of hippocampal volume in trauma survivors with PTSD. *Am J Psychiatry* 2001;158(8):1248-1251. PMCID: [PMC2819102](#)
104. Gugino LD, Romero R, Aglio L, *Titone D, Ramirez M, Pascual-Leone A, Grimson E, Weisenfeld N, Kikinis R, **Shenton ME**. Transcranial magnetic stimulation coregistered with MRI: A comparison of a guided versus blind stimulation technique and its effect on compound muscle action potentials. *Clin Neurophysiology* 2001;112(10):1781-1792. PMCID: [PMC2845153](#)
105. Gugino LD, Aglio LS, *Potts G, Grimson WEL, **Shenton ME**, Kikinis R, Alexander E, Gonzalez AA, Romero R, Ettinger GJ, Cote WA, Leventon ME, Black PM. Perioperative use of transcranial magnetic stimulation. *Techniques in Neurosurgery* 2001;7(1):33-51.
106. Nestor PG, Han SD, *Niznikiewicz M, *Salisbury D, *Spencer K, **Shenton ME**, McCarley RW. Semantic disturbance in schizophrenia and its relationship to the cognitive neuroscience of attention. *Biol Psychology* 2001;57:(1-3)23-46. PMCID: [PMC2849104](#)
107. Wible CG, *Anderson J, **Shenton ME**, *Kricun A, *Hirayasu Y, *Tanaka S, *Levitt JJ, O'Donnell BF, Kikinis R, Jolesz FA, McCarley RW. Prefrontal cortex, negative symptoms, and schizophrenia: An MRI study. *Psychiatr Res* 2001;108(2):65-78. PMCID: [PMC2845854](#)
108. *Dickey CC, McCarley RW, **Shenton ME**. The brain in schizotypal personality disorder: A review of structural MRI and CT findings. *Harvard Review of Psychiatry* 2002;10(1):1-15. PMCID: [PMC2854016](#)
109. Nestor PG, O'Donnell BF, McCarley RW, *Niznikiewicz, M, Barnard J, Shen ZJ, Bookstein FL, **Shenton ME**. A new statistical method for testing hypotheses of neuropsychological/MRI relationships in schizophrenia: partial least squares analysis. *Schizophr Res* 2002;53(1-2):57-66. PMCID: [PMC2845169](#)
110. *Salisbury DF, DeSantis MA, **Shenton ME**, McCarley RW. The effect of background noise on P300 to suprathreshold stimuli. *Psychophysiology* 2002;39(1):111-115. PMCID: [PMC2647509](#)
111. Mamata H, Mamata Y, Westin CF, **Shenton ME**, Kikinis R, Jolesz FA, Maier SE. High-resolution line scan diffusion tensor MR imaging of white matter fiber tract anatomy. *Am J Neuroradiol* 2002;23(1):67-75. PMCID: [PMC2845164](#)
112. *Salisbury DF, **Shenton ME**, Nestor PG, McCarley RW. Semantic bias, homograph comprehension, and event-related potentials in schizophrenia. *Clin Neurophysiology* 2002;113:383-395. PMCID: [PMC2650489](#)
113. *Kubicki M, Westin CF, Maier SE, *Frumkin M, Nestor PG, *Salisbury DF, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. Uncinate fasciculus findings in schizophrenia: A magnetic resonance diffusion tensor imaging study. *Am J Psychiatry* 2002;159(5):813-820. PMCID: [PMC2803760](#)
114. McCarley RW, *Salisbury DF, *Hirayasu Y, Yurgelun-Todd DA, Tohen M, Zarate C, Kikinis R, Jolesz FA, **Shenton ME**. Association between smaller left posterior superior temporal gyrus volume on magnetic resonance

imaging and smaller left temporal P300 amplitude in first-episode schizophrenia. *Arch Gen Psychiatry* 2002;59(4):321-331. PMID: [11926932](#) [full text]

115. *Levitt JJ, McCarley RW, *Dickey CC, Voglmaier MM, *Niznikiewicz MA, Seidman LJ, *Hirayasu Y, *Ciszewski AA, Kikinis R, Jolesz FA, **Shenton ME**. MRI study of caudate nucleus volume and its cognitive correlates in neuroleptic-naïve patients with schizotypal personality disorder. *Am J Psychiatry* 2002;159(7):1190-1197. PMCID: [PMC2826363](#)
116. **Shenton ME**, Gerig G, McCarley RW, Székely G, Kikinis R. Amygdala-hippocampal shape differences in schizophrenia: The application of 3D shape models to volumetric MR data. *Psychiatry Res: Neuroimaging* 2002;115(1-2):15-35. PMCID: [PMC2824647](#) [Selected as one of the most original and state-of-the art research articles in the area of Health and Medical Informatics in recent years, published in 2004 Yearbook of Medical Informatics: Towards Clinical Bioinformatics, Schattauer, IMIA-International Medical Informatics Association, GmbH, Stuttgart, Germany.]
117. *Frumkin M, Golland P, Kikinis R, *Hirayasu Y, *Salisbury DF, Hennen J, *Dickey CC, Anderson M, Jolesz FA, Grimson WEL, McCarley RW, **Shenton ME**. Shape differences in the corpus callosum in first-episode schizophrenia and first-episode psychotic affective disorder. *Am J Psychiatry* 2002;159(5):866-868. PMCID: [PMC2845853](#)
118. *Salisbury DF, **Shenton ME**, Griggs CB, Bonner-Jackson A, McCarley RW. Mismatch negativity and first episode schizophrenia. *Arch Gen Psychiatry* 2002;59(8):686-694. PMID: [12150644](#) [full text]
119. *Lee CU, **Shenton ME**, *Salisbury DF, *Kasai K, *Onitsuka T, *Dickey CC, Yurgelun-Todd D, Kikinis R, Jolesz FA, McCarley RW. Fusiform gyrus volume reduction in first-episode schizophrenia: A magnetic resonance imaging study. *Arch Gen Psychiatry* 2002;59(9):775-781. PMID: [12215076](#) [full text]
120. McInerney T, Hamarneh G, **Shenton M**, Terzopoulos D. Deformable organisms for automatic medical image analysis. *Med Image Analysis* 2002;6(3):251-266. PMCID: [PMC2845173](#) [Selected as one of the most original and state-of-the art research articles in the area of Health and Medical Informatics over the past several years for publication in the 2004 Yearbook of Medical Informatics: Towards Clinical Bioinformatics, Schattauer, IMIA-International Medical Informatics Association, GmbH, Stuttgart, Germany.]
121. *Anderson JE, Wible CG, McCarley RW, Jakab M, *Kasai K, **Shenton ME**. An MRI study of temporal lobe abnormalities and negative symptoms in chronic schizophrenia: An MRI study. *Schizophr Res* 2002;58:123-134. PMCID: [PMC2845171](#)
122. Gilbertson MW, **Shenton ME**, *Ciszewski A, *Kasai K, Lasko NB, Orr SP, Pitman RK. Smaller hippocampal volume predicts pathologic vulnerability to psychological trauma. *Nat Neuroscience* 2002;5(11):1242-1247. PMCID: [PMC2819093](#)
123. *Dickey CC, McCarley RW, Voglmaier MM, *Frumkin M, *Niznikiewicz MA, *Hirayasu Y, *Fraone S, Seidman LJ, **Shenton ME**. Smaller left Heschl's gyrus volume in patients with schizotypal personality disorder. *Am J Psychiatry* 2002;159(9):1521-1527. PMCID: [PMC2832788](#)
124. *Niznikiewicz MA, **Shenton ME**, Voglmaier M, Nestor PG, *Dickey CC, *Frumkin M, Seidman LJ, *Allen CG, McCarley RW. Semantic dysfunction in women with schizotypal personality disorder. *Am J Psychiatry* 2002;159(10):1767-1774. PMCID: [PMC2845844](#)
125. O'Donnell BF, *Potts GF, Nestor PG, Stylianopoulos KC, **Shenton ME**, McCarley RW. Spatial frequency discrimination in schizophrenia. *J Abnormal Psychology* 2002;111(4):620-625. PMCID: [PMC2848254](#)
126. *Kubicki M, **Shenton ME**, *Salisbury DF, *Hirayasu Y, *Kasai K, Kikinis R, Jolesz FA, McCarley RW. Voxel-based morphometric analysis of gray matter in first episode schizophrenia. *NeuroImage* 2002;17(4):1711-1719. PMCID: [PMC2845166](#)

127. *Kubicki M, Westin CF, Maier SE, Mamata H, *Frumin M, *Ersner-Hershfield H, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. Diffusion tensor imaging and its application to neuropsychiatric disorders. *Harvard Review of Psychiatry* 2002;10(6):324-336. PMCID: [PMC2853779](#)
128. *Kasai K, **Shenton ME**, *Salisbury DF, *Hirayasu Y, *Lee CU, *Ciszewski AA, Yurgelun-Todd D, Kikinis R, Jolesz FA, McCarley RW. Progressive decrease of left superior temporal gyrus gray matter volume in patients with first-episode schizophrenia. *Am J Psychiatry* 2003;160(1):156-164. PMCID: [PMC2845847](#)
129. *Onitsuka T, **Shenton ME**, *Kasai K, Nestor PG, *Toner SK, Kikinis R, Jolesz FA, McCarley RW. Fusiform gyrus volume reduction and facial recognition in chronic schizophrenia. *Arch Gen Psychiatry* 2003;60(4):349-355. PMID: [12695311](#) [full text]
130. *Kasai K, **Shenton ME**, *Salisbury DF, *Hirayasu Y, *Onitsuka T, *Spencer MH, Yurgelun-Todd DA, Kikinis R, Jolesz FA, McCarley RW. Progressive decrease of left Heschl gyrus and planum temporale gray matter volume in schizophrenia – A longitudinal study of first-episode patients. *Arch Gen Psychiatry* 2003;60(8):766-775. PMCID: [PMC2901861](#)
131. *Spencer KM, Nestor PG, *Niznikiewicz MA, *Salisbury DF, **Shenton ME**, McCarley RW. Abnormal neural synchrony in schizophrenia. *J Neuroscience* 2003;23(19):7407-7411. PMCID: [PMC2848257](#)
132. *Dickey CC, McCarley RW, Voglmaier MM, *Niznikiewicz MA, Seidman LJ, *Frumin M, *Toner S, *Demeo S, **Shenton ME**. A MRI study of fusiform gyrus in schizotypal personality disorder. *Schizophr Res* 2003;64(1):35-39. PMCID: [PMC2848253](#)
133. *Kasai K, **Shenton ME**, *Salisbury DF, *Onitsuka T, *Toner SK, Yurgelun-Todd D, Kikinis R, Jolesz FA, McCarley RW. Differences and similarities in insular and temporal pole MRI gray matter volume abnormalities in first-episode schizophrenia and affective psychosis. *Arch Gen Psychiatry* 2003;60(11):1069-1077. PMID: [14609882](#) [full text]
134. *Park HJ, *Kubicki M, **Shenton ME**, Guimond A, McCarley RW, Maier SE, Kikinis R, Jolesz FA, Westin CF. Spatial normalization of diffusion tensor MRI using multiple channels. *NeuroImage* 2003;20(4):1995-2009. PMCID: [PMC2811885](#)
135. *Kubicki M, Westin CF, Nestor PG, Wible CG, *Frumin M, Maier SE, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. Cingulate fasciculus integrity disruption in schizophrenia: A magnetic resonance diffusion tensor imaging study. *Biol Psychiatry* 2003;54:1171-1180.(Erratum in *Biol Psychiatry* 2004;55:661) PMCID: [PMC2806222](#)
136. *Kubicki M, McCarley RW, Nestor PG, Huh T, Kikinis R, **Shenton ME**, Wible CG. An fMRI study of semantic processing in men with schizophrenia. *NeuroImage* 2003;20(4):1923-1933. PMCID: [PMC2806220](#)
137. *Akdag SJ, Nestor PG, O'Donnell BF, *Niznikiewicz MA, **Shenton ME**, McCarley RW. The startle reflex in schizophrenia: Habituation and personality correlates. *Schizophr Res* 2003;64(2-3):165-173. PMCID: [PMC2845846](#)
138. Han SD, Nestor PG, **Shenton ME**, *Niznikiewicz M, Hannah G, McCarley RW. Associative memory in chronic schizophrenia: A computational model. *Schizophr Res* 2003;61(2-3):255-263. PMCID: [PMC2849103](#)
139. *Dickey CC, McCarley RW, Voglmaier MM, *Niznikiewicz MA, Seidman LJ, *Demeo S, *Frumin M, **Shenton ME**. An MRI study of superior temporal gyrus volume in women with schizotypal personality disorder. *Am J Psychiatry* 2003;160(12):2198-2201. PMCID: [PMC2826718](#)

140. *Wiegand LC, Warfield SK, *Levitt JJ, *Hirayasu Y, *Salisbury DF, Heckers S, *Dickey CC, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. Prefrontal cortical thickness in first episode psychosis: A magnetic resonance imaging study. *Biol Psychiatry* 2004;55(2):131-140. PMCID: [PMC2794421](#)
141. *Kubicki M, Maier SE, Westin CF, Mamata H, *Ersner-Hershfield H, Estepar R, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. Comparison of single-shot echo-planar and line scan protocols for diffusion tensor imaging. *Academic Radiology* 2004;11(2):224-232. PMCID: [PMC2793336](#)
142. *Levitt JJ, Westin CF, Nestor PG, Estepar RSJ, *Dickey CC, Voglmaier MM, Seidman LJ, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. Shape of caudate nucleus and its cognitive correlates in neuroleptic-naïve schizotypal personality disorder. *Biological Psychiatry* 2004;55(2):177-184. PMCID: [PMC2793335](#)
143. *May FS, *Chen CQ, Gilbertson MW, **Shenton ME**, Pitman RK. Cavum septum pellucidum in monozygotic twins discordant for combat exposure: Relationship to posttraumatic stress disorder. *Biological Psychiatry* 2004;55(6):656-658. PMCID: [PMC2794416](#)
144. *Salisbury DF, Griggs CB, **Shenton ME**, McCarley RW. The NoGo P300 'anteriorization' effect and response inhibition. *Clin Neurophysiology* 2004;115(7):1550-1558. PMCID: [PMC2706017](#)
145. *Niznikiewicz MA, Friedman M, **Shenton ME**, Voglmaier M, Nestor PG, *Frumkin M, Seidman L, *Sutton J, McCarley RW. Processing sentence context in women with schizotypal personality disorder: An ERP study. *Psychophysiology* 2004;41(3):367-371. PMCID: [PMC2794422](#)
146. *Park HJ, Westin CF, *Kubicki M, Maier SE, *Niznikiewicz M, *Baer A, *Frumkin M, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. White matter hemisphere asymmetries in healthy subjects and in schizophrenia: A diffusion tensor MRI study. *NeuroImage* 2004;23(1):213-223. PMCID: [PMC2794419](#) [Featured on the Cover of *NeuroImage*.]
147. *Onitsuka T, **Shenton ME**, *Salisbury DF, *Dickey CC, *Kasai K, *Toner SK, *Frumkin M, Kikinis R, Jolesz FA, McCarley RW. Middle and inferior temporal gyrus gray matter volume abnormalities in chronic schizophrenia: An MRI study. *Am J Psychiatry* 2004;161(9):1603-1611. PMCID: [PMC2793337](#)
148. *Park HJ, *Kubicki M, Westin CF, Talos IF, *Brun A, Pieper S, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. Method for combining information from white matter fiber tracking and gray matter parcellation. *AJNR* 2004;25(8):1318-1324. PMCID: [PMC2813857](#)
149. Nestor PG, *Kubicki M, Gurrera RJ, *Niznikiewicz M, *Frumkin M, McCarley RW, **Shenton ME**. Neuropsychological correlates of diffusion tensor imaging in schizophrenia. *Neuropsychology* 2004;18(4):629-637. PMCID: [PMC2790923](#) [Rated as one of top 50 papers requested in downloads for *Neuropsychology*.]
150. *Dickey CC, *Salisbury DF, *Nagy AI, *Hirayasu Y, *Lee CU, McCarley RW, **Shenton ME**. Follow-up MRI study of prefrontal volumes in first-episode psychotic patients. *Schizophr Res* 2004;71:349-351. PMCID: [PMC2798804](#)
151. *Kasai K, McCarley RW, *Salisbury DF, *Onitsuka T, *Demeo S, Yurgelun-Todd D, Kikinis R, Jolesz FA, **Shenton ME**. Cavum septi pellucidi in first-episode schizophrenic and affective psychosis: An MRI study. *Schizophr Res* 2004;71(1):65-76. PMCID: [PMC2811876](#)
152. *Park HJ, *Levitt JJ, **Shenton ME**, *Salisbury DF, *Kubicki M, Kikinis R, Jolesz FA, McCarley RW. An MRI study of spatial probability brain map differences between first-episode schizophrenia and normal controls. *NeuroImage* 2004;22(3):1231-1246. PMCID: [PMC2789267](#) [Featured on the Cover of *NeuroImage*.]

153. *Spencer KM, Nestor PG, Perlmutter R, *Niznikiewicz MA, Klump MC, *Frumin M, **Shenton ME**, McCarley RW. Neural synchrony indexes disordered perception and cognition in schizophrenia. *Proc Nat Acad Sci USA* 2004;101(49):17288-17293. PMCID: [PMC535363](#)
154. *Brun A, Knutsson H, *Park HJ, **Shenton ME**, Westin CF. Clustering fiber traces using normalized cuts. *Lect Notes Comput Sci* 2004; Sep 2; 3216/2004(3216):368-375. PMCID: [PMC3296487](#)
155. Golland P, Grimson WEL, **Shenton ME**, Kikinis R. Detection and analysis of statistical differences in anatomical shape. *Med Image Analysis* 2005;9(1):69-86. PMCID: [PMC2768070](#)
156. *Wiegand LC, Warfield SK, *Levitt JJ, *Hirayasu Y, *Salisbury DF, Heckers S, *Bouix S, *Schwartz D, *Spencer M, *Dickey CC, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. An *in vivo* MRI study of prefrontal cortical complexity in first-episode psychosis. *Am J Psychiatry* 2005;162(1):65-70. PMCID: [PMC2768063](#)
157. Voglmaier MM, Seidman LJ, *Niznikiewicz MA, *Dickey CC, **Shenton ME**, McCarley RW. A Comparative profile analysis of neuropsychological function in men and women with schizotypal personality disorder. *Schizophr Res* 2005;74(1):43-49. PMCID: [PMC2772126](#)
158. *Onitsuka T, Nestor PG, Gurrera RJ, **Shenton ME**, *Kasai K, *Frumin M, *Niznikiewicz MA, McCarley RW. Association between reduced extraversion and right posterior fusiform gyrus gray matter reduction in chronic schizophrenia. *Am J Psychiatry* 2005;162(3):599-601. PMCID: [PMC2770436](#)
159. Nestor PG, Piech R, *Allen C, *Niznikiewicz M, **Shenton ME**, McCarley RW. Retrieval-induced forgetting in schizophrenia. *Schizophr Res* 2005;75:199-209. PMCID: [PMC2772129](#)
160. *Kubicki M, *Park HJ, Westin CF, Nestor PG, Mulkern RV, Maier SE, *Niznikiewicz M, *Connor EE, *Levitt JJ, *Frumin M, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. DTI and MTR abnormalities in schizophrenia: Analysis of white matter integrity. *NeuroImage* 2005;26:1109-1118. PMCID: [PMC2768051](#)
161. *Nierenberg J, *Salisbury DF, *Levitt JJ, *David EA, McCarley RW, **Shenton ME**. Reduced left angular gyrus volume in first-episode schizophrenia. *Am J Psychiatry* 2005;162:1539-1541. PMCID: [PMC2766930](#)
162. *Nakamura M, McCarley RW, *Kubicki M, *Dickey CC, *Niznikiewicz MA, Voglmaier MM, Seidman LJ, Maier SE, Westin CF, Kikinis R, and **Shenton ME**. Fronto-temporal disconnectivity in schizotypal personality disorder: A diffusion tensor imaging study. *Biol Psychiatry* 2005;58(6):468-478. PMCID: [PMC2768055](#)
163. *Dickey CC, McCarley RW, *Niznikiewicz MA, Voglmaier MM, Seidman LJ, *Kim S, **Shenton ME**. Clinical, cognitive, and social characteristics of a sample of neuroleptic-naive persons with schizotypal personality disorder. *Schizophr Res* 2005;78:297-308. PMCID: [PMC2766931](#)
164. Gurrera RJ, *Dickey CC, *Niznikiewicz MA, Voglmaier MM, **Shenton ME**, McCarley RW. The five-factor model in schizotypal personality disorder. *Schizophr Res* 2005;80:243-251. PMCID: [PMC2768048](#)
165. *Kubicki M, Westin C-F, McCarley RW, **Shenton ME**. The application of DTI to investigate white matter abnormalities in schizophrenia. *Ann. N.Y. Acad. Sci.* 2005;1064:134-148. PMCID: [PMC2768113](#)
166. Pohl KM, Fisher J, *Levitt JJ, **Shenton ME**, Kikinis R, Grimson WE, Wells WM. A unifying approach to registration, segmentation, and intensity correction. *Med Image Comput Comput Assist Interv* 2005;8(Pt 1):310-318. PMCID: [PMC2784666](#)
167. Martin-Fernandez M, *Bouix S, *Ungar L, McCarley RW, **Shenton ME**. Two methods for validating brain tissue classifiers. *Med Image Comput Comput Assist Interv* 2005;8(Pt 1):515-522. PMCID: [PMC2775440](#)

168. *Onitsuka T, *Niznikiewicz MA, *Spencer KM, *Frumin M, *Kuroki N, *Lucia LC, **Shenton ME**, McCarley RW. Functional and structural deficits in brain regions subserving face perception in schizophrenia. *Am J Psychiatry* 2006;163:455-462. PMCID: [PMC2773688](#)
169. Nestor PG, Valdman O, *Niznikiewicz M, *Spencer K, McCarley RW, **Shenton ME**. Word priming in schizophrenia: Associational and semantic influences. *Schizophr Res* 2006;82:139-142. PMCID: [PMC2768044](#)
170. O'Donnell L, *Kubicki M, **Shenton ME**, *Dreusicke MH, Grimson WEL, Westin CF. A method for clustering white matter fiber tracts. *AJNR* 2006;27:1032-1036. PMCID: [PMC2768142](#)
171. *Kuroki N, *Kubicki M, Nestor PG, *Salisbury DF, *Park HJ, *Levitt JJ, *Woolston S, *Frumin M, *Niznikiewicz M, Westin CF, Maier SE, McCarley RW, **Shenton ME**. Fornix integrity and hippocampal volume in male schizophrenic patients. *Biol Psychiatry* 2006;60:22-31. PMCID: [PMC2768597](#)
172. *Koo MS, *Levitt JJ, McCarley RW, Seidman LJ, *Dickey CC, *Niznikiewicz MA, Voglmaier MM, *Zamani P, *Long KL, *Kim SS, **Shenton ME**. Reduction of caudate volume in neuroleptic-naïve female subjects with schizotypal personality disorder. *Biol Psychiatry* 2006;60:40-48. PMCID: [PMC2768064](#)
173. *Kuroki N, **Shenton ME**, *Salisbury DF, *Hirayasu Y, *Onitsuka T, *Ersner-Hershfield H, Yurgelun-Todd D, Kikinis R, Jolesz FA, McCarley RW. Middle and inferior temporal gyrus gray matter volume in first-episode schizophrenia: An MRI study. *Am J Psychiatry* 2006;163:2103-2110. PMCID: [PMC2766919](#)
174. Haider H, *Bouix S, *Levitt JJ, McCarley RW, **Shenton ME**, Soul JS. Characterizing the shape of anatomical structures with Poisson's equation. *IEEE Trans on Med Imaging* 2006;25(10):1249-1257. PMCID: [PMC2785042](#)
175. *Levitt JJ, *Chen QCC, *May FS, Gilbertson MW, **Shenton ME**, Pitman RK. Volume of cerebellar vermis in monozygotic twins discordant for combat exposure: Lack of relationship to post-traumatic stress disorder. *Psychiatry Research: Neuroimaging* 2006;148(2-3):143-149. PMCID: [PMC2768053](#)
176. *Koo MS, *Dickey CC, *Park HJ, *Kubicki M, *Ji NY, *Bouix S, Pohl KM, *Levitt JJ, *Nakamura M, **Shenton ME**, McCarley RW. Smaller neocortical gray matter and larger sulcal CSF volumes in neuroleptic-naïve females with schizotypal personality disorder. *Arch Gen Psychiatry* 2006;63:1090-1100. PMID: [17015811](#) [full text]
177. Pitman RK, Gilbertson MW, Gurvits TV, *May FS, Lasko NB, Metzger LJ, **Shenton ME**, Yeguda R, Orr SP. Clarifying the origin of biological abnormalities in PTSD through the study of identical twins discordant for combat exposure. *Annals NY Academy Science* 2006;1071:242-254. PMCID: [PMC2770249](#)
178. Styner M, Oguz I, Brechbühler C, Pantazis D, *Levitt JJ, **Shenton ME**, Gerig G. Framework for the statistical shape analysis of brain structures using SPHARM-PDM. *Insight J* 2006;1071:242-250. PMCID: [PMC3062073](#)
179. *Niethammer M, *Bouix S, Westin CF, **Shenton ME**. Fiber bundle estimation and parameterization. *Med Imag Comput Comput Assist Interv* 2006;9(Pt 2):252-259. PMCID: [PMC2773691](#)
180. *Pohl KM, Fisher J, **Shenton M**, McCarley RW, Grimson WE, Kikinis R, Wells LM. Logarithm odds maps for shape representation. *Med Imag Comput Comput Assist Interv* 2006;9(Pt 2):955-963. PMCID: [PMC2994060](#)
181. *Pohl KM, *Bouix S, *Nakamura M, Rohlfing T, McCarley RW, Kikinis R, Grimson WEL, **Shenton ME**, Wells WM. A hierarchical algorithm for MR brain parcellation. *IEEE Trans Med Imaging* 2007;26(9):1201-1212. PMCID: [PMC2768067](#)
182. *Kubicki M, McCarley R, Westin CF, *Park HJ, Maier SE, Kikinis R, Jolesz FA, **Shenton ME**. A review of diffusion tensor imaging studies in schizophrenia. *J Psychiatric Res* 2007;41:15-30. PMCID: [PMC2768134](#) [ESI Thomson Scientific, rated as one of the top 1% of fast breaking papers in the field of schizophrenia research: <http://sciencewatch.com/dr/fbp/2008/08aprbp/08aprbpKubicki/>]

183. *Nakamura M, Nestor PG, McCarley RW, *Levitt J, *Hsu L, *Kawashima T, *Niznikiewicz M, **Shenton ME**. Altered orbitofrontal sulco-gyral pattern in schizophrenia. *Brain* 2007;130:693-707. PMCID: [PMC2768130](#)
184. Nestor PG, *Kubicki M, *Spencer KM, *Niznikiewicz M, McCarley RW, **Shenton ME**. Attentional Networks and cingulum bundle in chronic schizophrenia. *Schizophr Res* 2007;90:308-315. PMCID: [PMC1906862](#)
185. *AhnAllen CG, Nestor PG, McCarley RW, **Shenton ME**. The role of retrieval inhibition in the associative memory impairment in schizophrenia. *Psychiatry Res* 2007;150:43-50. PMCID: [PMC1885480](#)
186. *Dickey CC, McCarley RW, Xu ML, Seidman LJ, Voglmaier MM, *Niznikiewicz MA, *Connor E, **Shenton ME**. MRI Abnormalities of the hippocampus and cavum septi pellucidi in females with schizotypal personality disorder. *Schizophr Res* 2007;89:49-58. PMCID: [PMC2777663](#)
187. Nestor PG, *Onitsuka T, Gurrera RJ, *Niznikiewicz M, *Frumin M, **Shenton ME**, McCarley RW. Dissociable contributions of MRI volume reductions of superior temporal and fusiform gyri to symptoms and neuropsychology in schizophrenia. *Schizophr Res* 2007;91:103-106. PMCID: [PMC2788774](#)
188. Nestor PG, *Kubicki M, *Kuroki N, Gurrera RJ, *Niznikiewicz M, **Shenton ME**, McCarley RW. Episodic memory and neuroimaging of hippocampus and fornix in chronic schizophrenia. *Psychiatry Res: Neuroimaging* 2007;155(1):21-28. PMID: [17395435](#)
189. *Onitsuka T, McCarley RW, *Kuroki N, *Dickey CC, *Kubicki M, *Demeo S, *Frumin M, Kikinis R, Jolesz FA, **Shenton ME**. Occipital lobe gray matter volume in male patients with chronic schizophrenia: A quantitative MRI study. *Schizophr Res* 2007;92:197-206. PPMCID: [PMC2396445](#)
190. *Salisbury DF, *Kuroki N, *Kasai K, **Shenton ME**, McCarley RW. Progressive and interrelated functional and structural evidence for post-onset brain reduction in schizophrenia. *Arch Gen Psychiatry* 2007;64:521-529. PMCID: [PMC2903200](#)
191. Gurrera RJ, *Nakamura M, *Kubicki M, *Dickey CC, *Niznikiewicz MA, Voglmaier MM, Seidman LJ, Maier SE, Westin C-F, McCarley RW, **Shenton ME**. The uncinate fasciculus and extraversion in schizotypal personality disorder: A diffusion tensor imaging study. *Schizophr Res* 2007; 90:360-362. PMCID: [PMC1876710](#)
192. *Bouix S, Martin-Fernandez M, *Ungar L, *Nakamura M, *Koo MS, McCarley RW, **Shenton ME**. On evaluating brain tissue classifiers without a ground truth. *NeuroImage* 2007;36(4):1207-1224. PMCID: [PMC2702211](#)
193. Cates J, Fletcher PT, Styner M, **Shenton M**, Whitaker R. Shape modeling and analysis with entropy-based particle systems. *Inf Process Med Imaging* 2007;20:333-345. PMCID: [PMC2768473](#)
194. *Pohl KM, Fisher J, *Bouix S, **Shenton M**, McCarley RW, Grimson WEL, Kikinis R, Wells WM. Using the logarithm of odds to define a vector space on probabilistic atlases. *Med Image Anal* 2007;11(5):465-477. PMCID: [PMC2423493](#) [Medical Image Analysis- MICCAI'06 Best Paper Prize (First Prize), 10th International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2007), Brisbane, Australia, October 29-November 2, 2007.]
195. Gilbertson MW, Williston SK, Paulus LA, Lasko NB, Gurvits TV, **Shenton ME**, Pitman RK, Orr SP. Configural cue performance in identical twins discordant for posttraumatic stress disorder: Theoretical implications for the role of hippocampal function. *Biol Psychiatry* 2007;62(5):513-20. PMCID: [PMC2768050](#)
196. *Nakamura M, *Salisbury DF, *Hirayasu H, *Bouix S, Pohl KM, Yoshida T, *Koo MS, **Shenton ME**, McCarley RW. Neocortical gray matter volume in first-episode schizophrenia and first-episode affective psychosis: A cross-sectional and longitudinal MRI study. *Biol Psychiatry* 2007;62(7):773-83. PMCID: [PMC2782514](#)

197. Balci SK, Golland P, **Shenton M**, Wells WM. Free-Form B-spline deformation model for groupwise registration. *Med Image Comput Comput Assist Interv* 2007;10(WS):23-30. PMCID: [PMC2836172](#)
198. *Niethammer M, Reuter M, Wolter FE, *Bouix S, Peinecke N, *Koo MS, **Shenton ME**. Global medical shape analysis using the Laplace-Bltrami spectrum. *Med Image Comput Comput Assist Interv* 2007;10(Pt 1):850-857. PMCID: [PMC2782516](#)
199. *Niethammer M, *Bouix S, Aja-Fernández S, Westin CF, **Shenton ME**. Outlier rejecdtion for diffusion PMCID: [PMC2788769](#)
200. Sabuncu MR, **Shenton ME**, Golland P. Joint registration and clustering of images. *Med Image Comput Comput Assist Interv* 2007;10(WS):47-54. PMCID: [PMC2836173](#)
201. Zollei L, **Shenton ME**, Wells WM, Pohl K. The Impact of Atlas Formation Methods on Atlas-Guided Brain Segmentation. *Med Image Comput Comput Assist Interv* 2007;10:39-46. [[full text](#)]
202. Pohl KM, *Bouix S, **Shenton ME**, Grimson WE, Kikinis R. Automatic Segmentation Using Non-Rigid Registration. *Med Image Comput Comput Assist Interv* 2007;26(9):1201-1212. PMCID: [PMC2856350](#)
203. *Kasai K, Yamasue H, Gilbertson MW, **Shenton ME**, Rauch SL, Pitman RK. Evidence for acquired pregenual anterior cingulate gray matter loss from a twin study of combat-related post-traumatic stress disorder. *Biol Psychiatry* 2008;63(6):550-556. PMCID: [PMC2752671](#)
204. *Spencer KM, *Niznikiewicz MA, **Shenton ME**, McCarley RW. Sensory-evoked gamma oscillations in chronic schizophrenia. *Biol Psychiatry* 2008;63:744-747. PMCID: [PMC2330275](#)
205. Nestor PG, *Kubicki M, *Niznikiewicz M, Gurrera RJ, McCarley RW, **Shenton ME**. Neuropsychological disturbance in schizophrenia: A diffusion tensor imaging study. *Neuropsychology* 2008;22(2):246-254. PMCID: [PMC2791789](#)
206. *Rosenberger G, *Kubicki M, Nestor PG, *Connor E, *Bushell GB, *Markant D, *Niznikiewicz M, Westin CF, Kikinis R, Saykin AJ, McCarley RW, **Shenton ME**. Age-related deficits in fronto-temporal connections in schizophrenia: A diffusion tensor imaging study. *Schizophr Res* 2008;102:181-188. PMCID: [PMC2684860](#)
207. *Koo MS, *Levitt JJ, *Salisbury DF, *Nakamura M, **Shenton ME**, McCarley RW. A cross-sectional and longitudinal magnetic resonance imaging study of cingulate gyrus gray matter volume abnormalities in first-episode schizophrenia and first-episode affective psychosis. *Arch Gen Psychiatry* 2008;65(7):746-760. PMCID: [PMC2793338](#)
208. *Nakamura M, Nestor PG, Levitt JJ, *Cohen AS, *Kawashima T, **Shenton ME**, McCarley RW. Orbitofrontal volume deficit in schizophrenia and thought disorder. *Brain* 2008;131:180-195. PMCID: [PMC2773826](#)
209. McCarley RW, *Nakamura M, **Shenton ME**, *Salisbury DF. Combining ERP and structural MRI information in first episode schizophrenia and bipolar disorder. *Clin EEG and Neuroscience* 2008;39(2):57-60. PMCID: [PMC2770258](#)
210. *AhnAllen CG, Nestor PG, **Shenton M**, McCarley RW, *Niznikiewicz MA. Early Nicotine withdrawal and transdermal nicotine effects on neurocognitive performance in schizophrenia. *Schizophr Res* 2008;100:261-269. PMCID: [PMC2365510](#)
211. *Spencer KM, *Salisbury DF, **Shenton ME**, McCarley RW. γ -band auditory steady-state responses are impaired in first episode psychosis. *Biol Psychiatry* 2008;64:369-375. PMCID: [PMC2579257](#)

212. *Dickey CC, Morocz IA, *Niznikiewicz MA, Voglmaier M, *Toner S, *Khan U, *Dreusicke M, Yoo SS, **Shenton ME**, McCarley RW. Auditory processing abnormalities in schizotypal personality disorder: An fMRI experiment using tones of deviant pitch and duration. *Schizophr Res* 2008;103:26-39. PMCID: [PMC3188851](#)
213. Aja-Fernandez S, *Niethammer M, *Kubicki M, **Shenton ME**, Westin CF. Restoration of DWI data using a Rician LMMSE estimator. *IEEE Trans Med Imaging* 2008;21(3):150-156. PMCID: [PMC2756835](#)
214. *Sampaio A, Sousa N, *Féرنandez M, Vasconcelos C, **Shenton ME**, Gonçalves Ó. MRI assessment of superior temporal gyrus in Williams syndrome. *Cognitive and Behavioural Neurology* 2008;21(3):150-156. PMCID: [PMC2770166](#)
215. *Kubicki M, Styner M, *Bouix S, Gerig G, *Markant D, *Smith K, Kikinis R, McCarley RW, **Shenton ME**. Reduced Interhemispheric Connectivity in Schizophrenia-Tractography Based Segmentation of the Corpus Callosum. *Schizophr Res* 2008;106(2-3):125-131. PMCID: [PMC2630535](#)
216. Malcolm J, *Rathi Y, **Shenton ME**, Tannenbaum A. Label space: a coupled multi-shape representation. *Med Image Comput Comput Assist Interv* 2008;11(Pt 2):416-424. PMCID: [PMC2805911](#)
217. Maddah M, *Kubicki M, Wells WM, Westin CF, Shenton ME, Grimson WE. Findings in schizophrenia by tract-oriented DT-MRI analysis. *Med Image Comput Comput Assist Interv* 2008;11(Pt 1):917-924. PMCID: [PMC2770163](#)
218. Sabuncu M, Balci S, **Shenton ME**, Golland P. Discovering modes of an imaging population through mixture modeling. *Med Image Comput Comput Assist Interv* 2008;11(Pt 2):381-389. PMCID: [PMC2671151](#)
219. *Lee KU, Yoshida T, *Kubicki M, *Bouix S, Westin CF, Kindlmann G, *Niznikiewicz M, *Cohen A, McCarley RW, **Shenton ME**. Increased diffusivity in superior temporal gyrus in schizophrenia: A diffusion tensor imaging study. *Schizophr Res* 2009;108(1-3):33-40. PMCID: [PMC2675036](#)
220. Whitfield-Gabrieli S, Thermenos HW, Milanovic S, Tsuang MT, Farone SV, McCarley RW, **Shenton ME**, Green AF, Nieto-Castanon A, LaViolette P, Wojcik J, Gabrieli JDE, Seidman LJ. Hyperactivity and hyperconnectivity of the default network in schizophrenia and first-degree relatives of persons with schizophrenia. *Proc Nat Acad Sci USA* 2009;105(4):1279-1284. PMCID: [PMC2633557](#)
221. *Voineskos AN, O'Donnell LJ, Lobaugh NJ, *Markant D, Ameis SH, *Niethammer M, Mulsant BH, Pollock BG, Kennedy JL, Westin CF, **Shenton ME**. Quantitative Examination of a Novel Clustering Method Using Magnetic Resonance Diffusion Tensor Tractography. *NeuroImage* 2009;45:370-376. PMCID: [PMC2646811](#)
222. *Fitzsimmons J, *Kubicki M, *Smith K, *Bushell G, Estepar SJ, Westin CF, Nestor PG, *Niznikiewicz MA, Kikinis R, McCarley RW, **Shenton ME**. Diffusion tractography of the fornix in schizophrenia. *Schizophr Res* 2009;107:39-46. PMCID: [PMC2646850](#)
223. *Kawashima T, *Nakamura M, *Bouix S, *Kubicki M, *Salisbury DF, Westin C-F, McCarley RW, **Shenton ME**. Uncinate fasciculus abnormalities in recent onset schizophrenia and affective psychosis: A diffusion tensor imaging study. *Schizophr Res* 2009;110:119-126. PMCID: [PMC2749228](#)
224. *Niznikiewicz MA, *Spencer KM, *Dickey D, Voglmaier M, Seidman LJ, **Shenton ME**, McCarley RW. Abnormal pitch mismatch negativity in individuals with schizotypal personality disorder. *Schizophr Res* 2009;110:188-193. PMID: [19327968](#)
225. Malcolm JG, **Shenton ME**, *Rathi Y. Neural tractography using an unscented Kalman filter. *Inf Process Med Imaging* 2009;21:16-138. PMCID: [PMC2768602](#)

226. Yoshida T, McCarley RW, *Nakamura M, *Lee KU, *Koo MS, *Bouix S, *Salisbury DF, Morra L, **Shenton ME**, *Niznikiewicz MA. A prospective longitudinal volumetric MRI study of superior temporal gray matter and amygdala-hippocampal complex in chronic schizophrenia. *Schizophr Res* 2009;113(1):84-94. PMCID: [PMC2776716](#)
227. *Rathi Y, Michailovich O, **Shenton ME**, *Bouix S. Directional functions for orientation distribution estimation. *Med Image Anal* 2009;13(3):432-444. PMCID: [PMC2677112](#)
228. Voglmaier MM, Seidman LJ, *Niznikiewicz MA, *Madan A, *Dickey CC, **Shenton ME**, McCarley RW. Dichotic listening in schizotypal personality disorder: Evidence for gender and laterality effect. *Schizophr Res* 2009;15:290-292. PMID: [19464150](#)
229. Sabuncu MR, Balci SK, **Shenton ME**, Golland P. Image-driven population analysis through mixture modeling. *IEEE Trans Med Imaging* 2009;29:1473-1487. PMCID: [PMC2832589](#)
230. *Levitt JJ, Styner M, *Niethammer M, *Bouix S, *Koo MS, Voglmaier MM, *Dickey CC, *Niznikiewicz MA, Kikinis R, McCarley RW, **Shenton ME**. Shape abnormalities of caudate nucleus in schizotypal personality disorder. *Schizophr Res* 2009;110(1-3):127-139. PMCID: [PMC2756791](#)
231. *Oh JS, *Kubicki M, *Rosenberger G, *Bouix S, *Levitt J, McCarley RW, Westin C-F, **Shenton ME**. Thalamo-frontal white matter alterations in chronic schizophrenia: A quantitative diffusion tractography study. *Human Brain Mapping* 2009;30(11):3812-3825. PMCID: [PMC2767408](#)
232. *Kubicki M, *Niznikiewicz M, *Connor E, *Ungar L, Nestor PG, *Bouix S, *Dreusicke M, Kikinis R, McCarley RW, **Shenton ME**. Relationship Between White Matter Integrity, Attention, and Memory in Schizophrenia: A Diffusion Tensor Imaging Study. *Brain Imaging and Behavior* 2009;3(2):191-201. PMCID: [PMC2885800](#)
233. *Onitsuka T, *Spencer KM, Lucia LC, **Shenton ME**, McCarley RW, *Niznikiewicz MA. Abnormal asymmetry of the face N170 repetition effect in male patients with chronic schizophrenia. *Brain Imaging and Behavior* 2009;3(3):240-5. PMID: [22005988](#)
234. *Savadjiev P, Kindlmann GL, *Bouix S, **Shenton ME**, Westin CF. Local White Matter Geometry Indices from Diffusion Tensor Gradients. *Med Image Comput Comput Assist Interv* 2009;12(Pt 1):345-52. PMCID: [PMC2892818](#) (**Received the 2009 MICCAI Young Scientist Award for the best paper:** <http://ubimon.doc.ic.ac.uk/MICCAI09/m773.html>).
235. Malcolm JG, **Shenton ME**, *Rathi Y. Two-tensor tractography using a constrained filter. *Med Image Comput Comput Assist Interv* 2009;12(Pt 1):894-902. PMCID: [PMC2893231](#)
236. Malcolm JG, Michailovich O, *Bouix S, Westin C-F, **Shenton ME**, *Rathi Y. A filtered approach to neural tractography using the Watson directional function. *Med Image Anal* 2010;14:58-59. PMID: [19914856](#)
237. *Savadjiev P, Kindlmann GL, *Bouix S, **Shenton ME**, Westin C-F. Local white matter geometry from diffusion tensor gradients. *Neuroimage* 2010;49(4):3175-3186. PMCID: [PMC2818447](#)
238. Nestor PG, *Kubicki M, *Nakamura M, *Niznikiewicz M, McCarley RW, **Shenton ME**. Comparing prefrontal gray and white matter contributions to intelligence and decision making in schizophrenia and healthy controls. *Neuropsychology* 2010;24:121-129. PMCID: [PMC2814796](#)
239. *Rathi Y, Malcolm J, *Bouix S, Tannenbaum A, **Shenton ME**. Affine registration of label maps in label space. *J Computing* 2010;2(4):1-11. [[full text](#)]
240. *Voineskos AN, Lobaugh NJ, *Bouix S, Rajji T, Miranda D, Kennedy JL, Mulsant BH, Pollock BG, **Shenton ME**. Diffusion tensor tractography findings in schizophrenia across the adult lifespan. *Brain* 2010;133(Pt5):1494-1504. PMCID: [PMC2859148](#)

241. *Sampaio A, Sousa N, *Fernandez M, Vasconelos C, **Shenton ME**, Gonçalves ÓF. Williams syndrome and memory: A neuroanatomical and cognitive approach. *J Autism and Developmental Disorders* 2010;40(7):870-877. PMID: [20101451](#)
242. *Whitford TJ, *Kubicki M, *Schneiderman JS, O'Donnell L, *King R, *Alvarado JL, *Khan U, *Markant D, Nestor PG, *Niznikiewicz M, McCarley RW, Westin C-F, **Shenton ME**. Corpus callosum abnormalities and their association with psychotic symptoms in patients with schizophrenia. *Biological Psychiatry* 2010;68(1):70-77. PMCID: [PMC2900500](#) [Featured on the Cover of Biological Psychiatry.]
243. *Rathi Y, Malcolm J, Michailovich O, Westin C-F, **Shenton ME**, *Bouix S. Tensor-kernels for simultaneous fiber model estimation and tractography. *Magn Reson Med* 2010;64(1):138-148. PMCID: [PMC3043656](#)
244. Malcolm J, **Shenton ME**, *Rathi Y. Filtered multi-tensor tractography. *IEEE Trans Med Imaging* 2010;29(9):1664-1675. PMCID: [PMC3045040](#)
245. *Nguyen AD, **Shenton ME**, *Levitt JJ. Olfactory dysfunction in schizophrenia: A review of neuroanatomy and psychophysiological measurements. *Harvard Review of Psychiatry* 2010;5:279-292. PMID: [20825265](#)
246. *Kikinis Z, Fallon JH, *Niznikiewicz M, Nestor PG, *Davidson C, *Bobrow L, *Pelavin P, Fischl B, Yenaki A, McCarley RW, Kikinis R, *Kubicki M, **Shenton ME**. Gray matter volume reduction in rostral middle frontal gyrus in patients with chronic schizophrenia. *Schizophr Res* 2010;123:153-159. PMCID: [PMC2975427](#)
247. *Dickey CC, Morocz IA, Minney D, *Niznikiewicz M, Volgmaier M, Panych LP, *Khan U, *Zacks R, *Terry D, **Shenton ME**, McCarley RW. Factors in sensory processing of prosody in schizotypal personality disorder: An fMRI experiment. *Schizophr Res* 2010;121(1-3):75-89. PMCID: [PMC2905482](#)
248. *Levitt JJ, *Kubicki M, Nestor PG, *Ersner-Herschfield H, Westin C-F, *Alvarado J, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. A diffusion tensor imaging study of the anterior limb of the internal capsule in schizophrenia. *Psychiatry Res: Neuroimaging* 2010;184(3):143-150. PMID: [21055906](#)
249. *Savadjiev P, *Rathi Y, Malcolm JG, **Shenton ME**, Westin CF. A geometry-based particle filtering approach to white matter tractography. *Med Image Comput Comput Assist Interv* 2010;13(Pt 1):233-240. PMCID: [PMC3081616](#)
250. *Rathi Y, Malcolm J, Michailovich O, Goldstein J, Seidman L, McCarley RW, Westin CF, **Shenton ME**. Biomarkers for identifying first-episode schizophrenia patients using diffusion weighted imaging. *Med Image Comput Comput Assist Interv* 2010;13(Pt 1):657-665. PMCID: [PMC3091029](#)
251. *Whitford TJ, *Kubicki M, Ghorashi S, *Schneiderman JS, *Hawley KJ, McCarley RW, **Shenton ME+**, *Spencer KM+. Predicting inter-hemispheric transfer time from the diffusion properties of the corpus callosum in healthy individuals and schizophrenia patients: A combined ERP and DTI study. *NeuroImage* 2011;54(3):2318-2329. (+equal last authorship.) PMCID: [PMC3006645](#)
252. *Spencer KM, Nestor PG, Valdman O, *Niznikiewicz MA, **Shenton ME**, McCarley RW. Enhanced facilitation of spatial attention in schizophrenia. *Neuropsychol* 2011;25:76-85. PMCID: [PMC3017629](#)
253. *Kubicki M, *Alvarado JL, Westin C-F, Tate DF, *Markant D, *Terry DP, *Whitford TJ, *De Siebenthal J, *Bouix S, McCarley R, Kikinis R, **Shenton ME**. Stochastic tractography study of inferior frontal gyrus anatomical connectivity in schizophrenia. *NeuroImage* 2011;55:1657-1664. PMCID: [PMC3073419](#)
254. Melonakos ED, **Shenton ME**, *Rathi Y, *Terry D, *Bouix S, *Kubicki M. Voxel-based morphometry (VBM) studies of schizophrenia – Can white matter changes be reliably detected with VBM? *Psychiatry Res: Neuroimaging* 2011;193(2):65-70. PMCID: [PMC3382976](#)

255. *Rathi R, *Kubicki M, *Bouix S, Westin C-F, *Goldstein J, Seidman LJ, Mesholam-Gately R, McCarley RW, **Shenton ME**. Statistical analysis of fiber bundles using multi-tensor tractography: Application to first-episode schizophrenia. *Magn Res Imaging* 2011;29(4):507-15. PMCID: [PMC3078978](#)
256. *Whitford TJ, *Savadjiev P, *Kubicki M, O'Donnell LJ, *Terry DP, *Bouix S, Westin C-F, *Schneiderman S, *Bobrow L, *Rausch AC, *Niznikiewicz M, Nestor PG, Pantelis C, Wood SJ, McCarley RW, **Shenton ME**. Fiber geometry in the corpus callosum in schizophrenia: Evidence for transcallosal misconnection. *Schizophr Res* 2011;Oct;132(1):69-74. PMCID: [PMC3172336](#)
257. *Choi H, *Kubicki M, *Whitford T, *Alvarado JL, *Terry DP, *Niznikiewicz M, McCarley RW, *Kwon JS, **Shenton ME**. Diffusion tensor imaging of anterior commissural fibers in patients with schizophrenia. *Schizophr Res* 2011;130:78-85. PMID: [21561738](#)
258. Uehara-Aoyama K, *Nakamura M, *Asami T, Yoshida T, Hayano F, *Roppongi T, Fujiwara A, Inoue T, **Shenton ME**, *Hirayasu Y. Sexually dimorphic distribution of orbitofrontal sulcogyrus pattern in schizophrenia. *Psychiatry Clin Neurosci* 2011;65(5):483-489. PMID: [21851457](#)
259. *Wasserman D, *Rathi Y, *Bouix S, *Kubicki M, Kikinis R, **Shenton M**, Westin CF. White matter bundle registration and population analysis based on Gaussian processes. *Inf Process Med Imaging* 2011;22:320-332. PMCID: [PMC3140022](#)
260. *Dickey CC, Panych LP, Voglmaier MM, *Niznikiewicz MA, *Terry DP, Murphy C, *Zacks R, **Shenton ME**, McCarley RW. Facial emotion recognition and facial affect display in schizotypal personality disorder. *Schizophr Res* 2011;131:242-249. PMCID: [PMC3159849](#)
261. Gavett BE, Cantu RC, **Shenton M**, *Lin AP, McKee AC, Stern RA. Clinical appraisal of chronic traumatic encephalopathy: Current perspectives and future directions. *Current Opinion in Neurology* 2011;24:525-531. PMID: [22045219](#)
262. Koerte I, *Pelavin P, Kirmess B, Fuchs T, Berweck S, Lauberder RP, Borggraefe I, Schroeder AS, Denekó A, Rummeny C, Reiser M, *Kubicki M, **Shenton M**, Ertl-Wagner B, Heinen F. Anisotropy of transcallosal motor fibers indicates functional impairment in children with periventricular leukomalacia. *Dev Med Child Neurol* 2011;53(2):179-186. PMCID: [PMC3057566](#)
263. *Rathi Y, Michailovich O, Setsompop K, *Bouix S, **Shenton ME**, Westin CF. Sparse multi-shell diffusion imaging. *Med Image Comput Comput Assisted Interv* 2011;14(Pt 2):58-65. PMID: [21995013](#)
264. *Nguyen AD, *Pelavin PE, **Shenton ME**, *Chilakamarri P, McCarley RW, Nestor PG, *Levitt JJ. Olfactory sulcal depth and olfactory bulb in patients with schizophrenia: An MRI study. *Brain Imaging Behavior*; 2011;(4):252-61. PMID: [21728040](#)
265. Capitão L, *Sampaio A, Sampaio C, Vasconcelos C, Fernández M, Garayzábal E, **Shenton ME**, Gonçalves OF. MRI amygdala volume in Williams syndrome. *Res Dev Dis* 2011;32(6):2767-2772. PMID: [21752593](#)
266. *Whitford TJ, Mathalon DH, **Shenton ME**, Roach BJ, Bammer R, Adcock RA, *Bouix S, *Kubicki M, *De Siebenthal J, *Rausch AC, *Schneiderman JS, Ford JM. Electrophysiological and diffusion tensor imaging evidence of delayed corollary discharges in patients with schizophrenia. *Psychol Med* 2011;41(5):959-969. PMID: [20663254](#)
267. Xu H, Haroutunian V, Bartzokis G, **Shenton ME**. Oligodendrocytes and schizophrenia (editorial). *Schizophr Res Treatment* 2011;2011:249768. PMCID: [PMC3420671](#)
268. *Whitford TJ, *Kubicki M, **Shenton ME**. Diffusion tensor imaging, structural connectivity, and schizophrenia. *Schizophr Res Treatment* Epub 2011 Jul 17. PMCID: [PMC3420716](#)

269. *Voineskos AN, Rajji TK, Lobaugh NJ, Miranda D, **Shenton ME**, Kennedy JL, Pollock BG, Mulsant BH. Age-related decline in white matter tract integrity and cognitive performance: A DTI tractography and structural equation modeling study. *Neurobiol Aging* 2012;33(1):21-34. PMCID: [PMC2945445](#)
270. Gooding DC, Coleman MJ, Simone RA, **Shenton ME**, Levy DL, Erlenmeyer-Kimling L. Thought disorder in high-risk offspring of schizophrenic patients: Findings from the New York High-Risk Project. *Schizophr Bull* 2012;(38)2:263-271. PMCID: [PMC3283153](#)
271. Mulert C, Kirsch V, *Whitford TJ, *Alvarado J, *Pelavin P, McCarley RW, *Kubicki M, *Salisbury D, **Shenton ME**. Hearing voices: A role of interhemispheric auditory connectivity? *The World Journal of Biological Psychiatry* 2012;(2):153-158. PMID: [21623667](#)
272. *Asami T, *Bouix S, *Whitford TJ, **Shenton ME**, *Salisbury DF, McCarley RW. Longitudinal loss of gray matter volume in patients with first-episode schizophrenia: DARTEL automated analysis and ROI validation. *NeuroImage* 2012;59(2):986-996. PMCID: [PMC3230661](#)
273. *Whitford TJ, Ford JM, Mathalon DH, *Kubicki M, **Shenton ME**. Schizophrenia, myelination, conduction delays and corollary discharges: A hypothesis. *Schizophr Bull* 2012;38(3):486-495. PMCID: [PMC3329979](#)
274. *Levitt JJ, *Alvarado JL, Nestor PG, *Rosow L, *Pelavin PE, McCarley RW, Kubicki M, **Shenton ME**. Fractional anisotropy and radial diffusivity: Diffusion measures of white matter abnormalities in the anterior limb of the internal capsule in schizophrenia. *Schizophr Res* 2012; 136(1-3):55-62. PMID: [22019073](#)
275. *Whitford TJ, Wood SJ, Yung A, Cocchi L, Berger G, **Shenton ME**, *Kubicki M, Phillips L, Velakoulis D, Yolken RH, Pantelis C, McGorry P, Amminger GP. Structural abnormalities in the cuneus associated with Herpes Simplex Virus (type 1) infection in people at ultra high risk of developing psychosis. *Schizophr Res* 2012;135(1-3):175-180. PMCID: [PMC3405258](#)
276. *Oh JS, Jang JH, Jung WH, Kang DH, Choi JS, Choi CH, *Kubicki M, **Shenton ME**, Kwon JS. Reduced fronto-callosal fiber integrity in unmedicated OCD patients: A diffusion tractography study. *Hum Brain Mapp* 2012;33(10):2441-2452. PMID: [21922600](#)
277. *Rosenberger G, Nestor P, *Oh JS, *Levitt JJ, *Kindleman G, *Bouix S, *Fitzsimmons J, Niznikiewicz M, Westin C-F, Kikinis R, McCarley RW, **Shenton ME**, *Kubicki M. Anterior Limb of the Internal Capsule in Schizophrenia: A Diffusion Tensor Tractography Study. *Brain Imaging and Behavior* 2012;6(3):417-425. PMID: [22415192](#)
278. Musen G, Jacobson AM, Bolo NR, Simonson DC, **Shenton ME**, McCartney RL, Flores VL, *Hoogenboom WS. Resting state brain functional connectivity is altered in type 2 diabetes. *Diabetes* 2012;61(9):2375-2379. PMCID: [PMC3425418](#)
279. **Shenton ME**, Hamoda HM, Schneiderman JS, Bouix S, Pasternak O, Rathi Y, Vu M-A, Purohit MP, Helmer K, Koerte I, *Lin AP, Westin C-F, Kikinis R, Kubicki M, Stern RA, Zafonte R. A review of magnetic resonance imaging and diffusion tensor imaging findings in mild traumatic brain injury. *Brain Imaging and Behavior* 2012;6(2):137-192. (**Most Downloaded Article for this Journal**) PMID: [22438191](#)
280. Tate DF, **Shenton ME**, Bigler ED. Introduction to the brain imaging and behavior special edition on neuroimaging findings in mild traumatic brain injury. *Brain Imaging and Behavior* 2012;6(2):103-107. PMID: [22706729](#)
281. Baugh CM, Stamm JM, Riley DO, Gavett BE, **Shenton ME**, Lin A, Nowinski CJ, Cantu RC, McKee AC, Stern RA. Chronic traumatic encephalopathy: neurodegeneration following repetitive concussive and subconcussive brain trauma. *Brain Imaging and Behavior* 2012;6(2):244-254. PMID: [22552850](#)

282. *Kikinis Z, *Asami T, *Bouix S, Finn CT, *Ballinger T, Tworog-Dube E, Kucherlapati R, Kikinis R, **Shenton ME**. Reduced fractional anisotropy and axial diffusivity in white matter in 22q11.2 deletion syndrome: A pilot study. *Schizophr Res* 2012;141(1):35-39. PMCID: [PMC3462006](#)
283. Francis AN, Seidman LJ, Jabbar GA, Mesholam-Gately R, Thermenos HW, Juelich R, Proal A, **Shenton M**, *Kubicki M, Mathew I, Keshavan M, DeLisi LE. Alterations in brain structures underlying language function in young adults at high familial risk for schizophrenia. *Schizophr Res* 2012;141(1):65-71. PMCID: [PMC3466598](#)
284. Gao Y, Kikinis R, Bouix S, Shenton M, Tannenbaum A. A 3D interactive multi-object segmentation tool using local robust statistics driven active contours. *Med Image Anal* 2012;16:1216-1227. PMCID: [PMC3443290](#)
285. *Pasternak O, Westin C-F, *Bouix S, Seidman LS, *Goldstein JM, Woo T-U, Petryshen TL, Mesholam-Kately RI, McCarley RW, Kikinis R, **Shenton ME**, *Kubicki M. Excessive extracellular volume reveals a neurodegenerative pattern in schizophrenia onset. *J Neurosci* 2012;32(48):17365-17372. PMID: [23197727](#) (**Figure featured in this week in the journal.**)
286. *Koerte IK, Ertl-Wagner B, Reiser M, Zafonte R, **Shenton ME**. White matter integrity in the brains of professional soccer players without a symptomatic concussion. *JAMA* 2012;308(18):1859-1861. PMID: [23150002](#)
287. *+Koerte IK, +Kaufman D, Hartl E, *Bouix S, *Pasternak O, *Kubicki M, Rauscher A, Li DK, Dadachanji SB, Tauton JA, Forwell LA, Johnson AM, Echlin PS, **Shenton ME**. A prospective study of physician-observed concussion during a varsity university hockey season: White matter integrity in ice hockey players. Part 3 of 4. *Neurosurgery Focus (JNS)* 2012;33(6):E3. (+Denotes equal first authorship.) PMID: [23199426](#) [full text]
288. *Hoogenboom WS, Perlis RH, Smoller JW, Zeng-Treiterler Q, Gainer VS, Murphy SN, Churchill SE, Kohane IS, **Shenton ME**, *Iosifescu DV. Limbic system white matter microstructure and long-term treatment outcome in major depressive disorder: A diffusion tensor imaging study using legacy data. *World J Biol Psychiatry* [Epub 2012 Apr 30]. PMID: [22540406](#)
289. *Pasternak O, **Shenton ME**, Westin CF. Estimation of extracellular volume from regularized multi-shell diffusion MRI. *Med Image Comput Comput Assist Interv*. 2012;15(Pt2):305-312. PMID: [23286062](#)
290. Makris N, Preti MG, *Asami T, *Pelavin P, Campbell B, Papadimitriou GM, Kaiser J, Baselli G, Westin C-F, **Shenton ME**, *Kubicki M. Human middle longitudinal fascicle: Variations in patterns of anatomical connections. *Brain Struct Funct* 2013;July 218(4):951-968. PMCID: [PMC3500586](#) [Available on 2014/7/1]
291. *Voineskos AN, Felsky D, Kovacevic N, Tiwari AK, Zaj C, Chakraarty MM, Lobaugh NL, **Shenton ME**, Rajji TK, Miranda D, Pollack BG, Mulsant BH, McIntos AR, Kennedy JL. Oligodendrocyte genes, white matter tract integrity, and cognition in schizophrenia. *Cerebral Cortex* 2013;Sep 23(9):2044-2057. PMID: [22772651](#)
292. Nestor PG, *Nakamura M, *Niznikiewicz M, Thompson E, *Levitt JJ, Chaote V, **Shenton ME**, McCarley RW. In search of the functional neuroanatomy of sociality: MRI subdivisions of orbital frontal cortex and social cognition. *Social Cognitive and Affective Neuroscience* 2013;8(4):460-467. PMID: [22345366](#)
293. *+Sampaio A, *+Bouix S, Sousa N, Vasconcelos C, Fernández M, **Shenton ME**, Gonçalves OF. Morphometry of corpus callosum in Williams syndrome: Shape as an index of neural development. *Brain Struct Funct* 2013;218(3):711-720. (+Denotes equal first authorship.) PMID: [22648762](#)
294. *Lee SH, *Kubicki M, *Asami T, Seidman LJ, *Goldstein JM, Mesholam-Gately RI, McCarley RW, **Shenton ME**. Extensive White Matter Abnormalities in Patients with First-Episode Schizophrenia: A Diffusion Tensor Imaging (DTI) Study. *Schizophr Res* 2013;143(2-3):231-238. PMID: [23290268](#)
295. Nestor PG, *Kubicki M, *Nakamura M, *Niznikiewicz M, *Levitt JJ, **Shenton ME**, McCarley RW. Neuropsychological variability, symptoms, and brain imaging in chronic schizophrenia. *Brain Imaging and Behavior* 2013;7(1):68-76. PMID: [23011383](#)

296. *Asami T, *Whitford TJ, *Bouix S, *Dickey CC, *Niznikiewicz M, **Shenton ME**, Voglmaier MM, McCarley RW. Globally and locally reduced MRI gray matter volumes in neuroleptic-naïve men with schizotypal personality disorder: association with negative symptoms. *JAMA Psychiatry* 2013;70(4):361-372. PMID: [23389420](#)
297. *Asami T, *Saito Y, *Whitford TJ, Makris N, *Niznikiewicz M, McCarley RW, **Shenton ME**, *Kubicki M. Abnormalities of middle longitudinal fascicle and disorganization in patients with schizophrenia. *Schizophr Res* 2013;143(2-3):253-259. PMID: [23290607](#)
298. *Quan M, *Lee S-H, *Kubicki M, *Kikinis Z, *Rathi Y, Seidman LJ, Mesholam-Gately R, *Goldstein JM, McCarley RW, +**Shenton ME**, *+Levitt JJ. White matter tract abnormalities between rostral middle frontal gyrus, inferior frontal gyrus and striatum in first-episode schizophrenia. *Schizophr Res* 2013;145(1-3):1-10. (+Denotes equal last authorship.) PMID: [23415471](#)
299. *Roma-Nava F, *Hoogenboom WS, *Pelavin P, *Alvarado JL, *Bobrow LH, McMaster FP, Keshavan M, McCarley RW, **Shenton ME**. Pituitary volume in schizophrenia spectrum disorders. *Schizophr Res* 2013;146(1-3):301-307. PMID: [23522905](#)
300. *Araki T, *Niznikiewicz M, *Kawashima T, Nestor PG, **Shenton ME**, McCarley RW. Disruption of function-structure coupling in brain regions sub-serving self monitoring in schizophrenia. *Schizophr Res* 2013;146(1-3):336-343. PMID: [23507356](#)
301. Hoogenboom WS, Perlis RH, Smoller JW, Zeng-Treitler Q, Gainer VS, Murphy SN, Churchill SE, Kohane I, **Shenton ME**, *Iosifescu DV. Feasibility of studying brain morphology in major depressive disorder with structural magnetic resonance imaging and clinical data from the electronic medical record: A pilot study. *Psychiatr Res: Neuroimaging* 2013;211(3):202-213. PMID: [23149041](#)
302. *Savadjiev P, *Whitford TJ, Hough ME, Von Hohenberg C, *Bouix S, Westin C-F, **Shenton ME**, Crow TJ, James AC, *Kubicki M. Sexually dimorphic white matter geometry abnormalities in adolescent onset schizophrenia. *Cerebral Cortex* [Epub 2013 Jan 10]. PMID: [23307635](#)
303. *Clemm von Hohenberg C, Schocke MF, *Wigand MC, Nachbauer W, Guttmann CRG, *Kubicki M, **Shenton ME**, Boesch, Egger K. Radial diffusivity in the cerebellar peduncles correlates with clinical severity in Friedreich ataxia. *Neurol Sci* 2013;34(8):1459-1462. PMID: [23640016](#)
304. *+Bouix S, *+Pasternak O, *Rathi Y, *Pelavin PE, Zafonte R, **Shenton ME**. Increased gray matter diffusion anisotropy in patients with persistent post-concussive symptoms following mild traumatic brain injury. *PLoS ONE* 2013;8(6):e66205. (+Denotes that authors contributed equally to this work.) PMID: [23776631](#)
305. *Clemm von Hohenberg C, *Wigand MC, *Kubicki M, Leicht G, Giegling I, Karch S, Hartmann AM, Konte B, Friedl M, Ballinger T, Eckbo R, *Bouix S, Jäger L, **Shenton ME**, Rujescu D and Mulert C, CNTNAP2 polymorphisms and structural brain connectivity: A diffusion-tensor imaging study. *J Psychiatr Res* 2013;47(10):1349-1356. PMID: [23871450](#)
306. *Levitt JJ, *Rosow LK, Nestor PG, *Pelavin PE, *Swisher TM, McCarley RW, **Shenton ME**. A volumetric MRI study of limbic, associative and sensorimotor striatal subregions in schizophrenia. *Schizophr Res* 2013;145(1-3):11-19.
307. *Kubicki M, **Shenton ME**, Maciejewski PK, *Pelavin PE, *Hawley KJ, *Ballinger T, *Swisher T, Jabbar GA, Thermenos HW, Keshavan MS, Seidman LJ, DeLisi LE. Decreased axial diffusivity within language connections: A possible biomarker of schizophrenia risk. *Schizophr Res* 2013;148(1-3):67-73.
308. Makris N, Preti MG, *Wasserman D, *Rathi Y, Papadimitriou CM, Dickerson BC, **Shenton ME**, *Kubicki M. Human middle longitudinal fascicle: Segregation and behavioral-clinical implications of two distinct fiber

connections linking temporal pole and superior temporal gyrus with the angular gyrus or superior parietal lobule using multi-tensor tractography. *Brain Imaging and Behavior* 2013;7(3):335-352.

309. Gao Y, *Bouix S, **Shenton M**, Tannenbaum A. Sparse texture active contour. *IEEE Trans Image Process* 2013;10:3866-3878.
310. +*Egger K, +*Clemm von Hohenberg C, Schocke MF, Guttmann CRG, *Wassermann D, *Wigand MC, Nachbauer W, Kremser C, Sturm B, Scheiber-Mojdehkar B, *Kubicki M, **Shenton ME**, Boesch S. White matter changes in patients with Friedreich ataxia after treatment with erythropoietin. *J of Neuroimaging* 2013;000:1-5 DOI:10.1111/jon.12050. (+denotes equal first authorship.)
311. Kikinis Z, Makris N, Finn CT, Bouix S, Lucia D, Coleman MJ, Tworog-Dube E, Kikinis R, Kucherlapati R, **Shenton ME**, Kubicki M. Genetic contributions to changes of fiber tracts of ventral visual stream in 22q11.2 deletion syndrome. *Brain Imaging and Behavior* 2013;7(3):316-325. PMID: 23612843
312. Thermenos HW, Whitfield-Gabrieli S, Seidman LJ, Kuperberg G, Juelich RJ, Divatia S, Riley C, Jabbar GA, **Shenton M**, *Kubicki M, Manschreck T, Keshavan M, Delisi LE. Altered language network activity in young people at familial high-risk for schizophrenia. *Schizophr Res* 2013;151(1-3):229-237.
313. Francis AN, Seidman LJ, Tandon N, **Shenton ME**, Thermenos HW, Mesholam-Gately RI, Va Eist LT, Tuschen-Caffier B, DeLisi LE, Keshavan MS. Reduced Subiculum Subdivisions of the Hippocampal Formation and Verbal Declarative Memory Impairments in Young Relatives at Risk for Schizophrenia. *Schizophr Res* 2013;151(1-3):154-157.
314. +*Clemm von Hohenberg C, *Pasternak O, *Kubicki M, *Ballinger T, *Vu M-A, *Swisher T, *Green K, *Giwerc M, *Dahlben B, *Goldstein JM, Woo T-U, Petryshen TL, Mesholam-Gately RI, Woodberry KA, Thermenos HW, Mulert C, McCarley RW, Seidman LJ, **Shenton ME**. White matter microstructure in individuals at clinical high risk of psychosis: A whole-brain diffusion tensor imaging study. *Schizophr Bull* 2014; 40(4):895-903. PMID: 23737549
315. *Ohtani T, *Bouix S, *Hosokawa T, *Saito Y, *Eckbo R, *Ballinger T, *Rausch A, Melonakos E, McCarley RW, **Shenton ME**, *Kubicki M. Prefrontal cortex volume deficit in schizophrenia: A new look using 3T MRI with manual parcellation. *Schizophr Res* 2014;152(1):184-190. PMID: 24280350
316. Perlstein MD, Antshel KM, Chohan MR, Coman IL, Fremont WP, Gnirke MR, *Kikinis Z, Middleton FA, Radovcic PD, **Shenton ME**, Kates WR. White matter abnormalities in 22q11.2 deletion syndrome: Preliminary association with the NOGO-66 receptor gene and symptoms of psychosis. *Schizophr Res* 2014;152(1):117-123.
317. *Pasternak O, *Koerte I, *Bouix S, *Fredman E, *Sasaki T, Mayinger M, Helmer KG, Johnson AM, Holmes JD, Forwell LA, Skopelja E, **Shenton ME+**, Echlin P+. Microstructural white matter alterations in acutely concussed ice hockey players, Part 1: a longitudinal free-water study. *J Neurosurg* 2014;120(4):873-881. (+denotes dual last authorship)
318. *Sasaki T, *Pasternak O, Mayinger M, Muelmann M, *Savadjiev P, *Bouix S, *Kubicki M, *Fredman E, *Dahlben B, Helmer K, Johnson AM, Holmes JD, Forwell LA, Skopelja E, **Shenton ME**, Echlin P+, *Koerte IK+. Changes in white matter microstructure in ice hockey players with a history of concussion: A diffusion tensor imaging study, Part 2: a diffusion tensor imaging study. *J Neurosurg* 2014;120(4):882-990. (+denotes dual last authorship)
319. Helmer KG, *Pasternak O, *Fredman E, Preciado R, *Koerte I, *Sasaki T, Mayinger M, Johnson A, Holmes J, Forwell L, Skopelja E, **Shenton ME+**, Echlin P+. Susceptibility-weighted imaging study in male and female ice hockey players over a single season, Part 3. Clinical article. *J Neurosurg* 2014;120(4):864-873. (+denotes dual last authorship)

320. Hüttlova J+, *Kikinis Z+, Kerkovsky M, *Bouix S, *Vu M-A, Makris N, **Shenton ME**, Kasperek T. Abnormalities in myelination in patients with schizophrenia and deficits in movement sequencing. *Cerebellum* 2014;13(4):415-424. (+Denotes equal first authorship).
321. Woodberry KA, Serur RA, Hallinan SB, Mesholam-Gately RI, Giuliano AJ, Wojcik JD, Keshavan MS, Frazier JA, Goldstein JM, **Shenton ME**, McCarley RW, Seidman LJ. Frequency and pattern of childhood symptom onset reported by first episode schizophrenia and clinical high risk youth. *Schizophr Res* 2014;158:45-51.
322. Ng TSC+, *Lin AP+, *Koerte IK, *Pasternak O, Liao H, Merugumala S, *Bouix S, **Shenton ME**. Neuroimaging in repetitive brain trauma. *Alzheimer's Research and Therapy*. (In Press). (+denotes dual first authorship) DOI is 10.1186/alzrt239
323. *Hoogenboom W, Marder T, Flores V, Huisman S, Eaton H, *Schneiderman J, Bolo N, Simonson D, Jacobson A, *Kubicki M, **Shenton ME**, Musen G. Cerebral white matter integrity and resting-state functional connectivity in middle-aged patients with type 2 diabetes. *Diabetes* (In Press).
324. *Del Re E, Bergen SE, Mesholam-Gately R, *Niznikiewicz M, Goldstein JM, Woo T-U, **Shenton ME**, Seidman L, McCarley RW, Petryshen TL. Analysis of schizophrenia-related genes and electrophysiological measures reveals ZNF804A association with amplitude of P300b elicited by novel sounds. *Translational Psychiatry* (In Press).
325. *Wigand M, *Kubicki M, *Clemm von Hohenberg C, Leicht G, Karch S, *Eckbo R, *Pelavin PE, *Hawley K, Miller M, Rujescu D, *Bouix S, **Shenton ME**, Mulert C. The interhemispheric auditory pathway and its meaning for auditory hallucinations in chronic schizophrenia. *The World Journal of Biological Psychiatry* (In Press).
326. *Rathi Y, *Pasternak O, *Savadjiev P, Michailovich O, *Bouix S, *Kubicki M, Westin C-F, **Shenton ME**. Gray matter alterations in early aging: A diffusion magnetic resonance imaging study. *Human Brain Mapping* (In Press).
327. Maier-Hein KH, Westin C-F, **Shenton ME**, Weiner MW, Raj A, Thomann P, Kikinis R, Stieljes B, *Pasternak O. Widespread white matter degeneration preceding the onset of dementia. *Alzheimer's and Dementia* (In Press).
328. Oribe N, Hirano Y, Kanbara S, del Re EC, Seidman L, Mesholam-Gately R, Goldstein JM, **Shenton ME**, *Spencer KM, McCarley RW, *Niznikiewicz MA. Progressive Reduction of Visual P300 Amplitude in Patients With First Episode Schizophrenia: An ERP study. *Schizophr Bull* (In Press).
329. Pietersen CY, Mauney SA, Kim SS, Passeri E, Lim MP, Rooney RJ, Goldstein JM, Petreyshen TL, Seidman LF, **Shenton ME**, McCarley RW, Sontag K-C, Woo T-U W. Molecular profiles of parvalbumin-immunoreactive neurons in the superior temporal cortex in schizophrenia. *J Neurogenetics* Early online: 1-16, 2014. DOI: 10.3109/01677063.2013.878339. ISSN: 0167-7063 print/1563-15260 online.
330. *Whitford TJ, *Lee S-W, *Oh JS, de Luis-Garcia R, *Savadjiev P, *Alvarado JL, Westin C-F, *Niznikiewicz M, Nestor PG, McCarley RW, *Kubicki M, **Shenton ME**. Localized abnormalities in cingulum bundle in patients with schizophrenia: A diffusion tensor tractography study. *Neuroimage Clinical* (In Press).
331. Juenger H, *Koerte IK, *Muehlmann M, *Mayinger M, Mall V, Krägeloh-Mann, **Shenton ME**, Berweck S, Staudt M, Heinen F. Microstructure of transcallosal motor fibers reflects type of cortical (re-)organization in congenital hemiparesis. *European Journal of Paediatric Neurology* (EJNP) 2014;18:691-697. PMID: 24993149
332. Kates WR, Olszewski AK, Gnirke MH, *Kikinis Z, Nelson J, Antshel KM, Fremont W, Radoeva PD, Middleton FA, **Shenton ME**, Coman IL. White matter microstructural abnormalities of the cingulum bundle in youth with 22q11.2 deletion syndrome: Associations with medication, neuropsychological function, and prodromal symptoms of psychosis. *Schizophr Res* (In Press).

333. *Purohit MP, Sherman L, Zafonte RD, Davis RB, *Giwerc MY, **Shenton ME**, Yeh GY. Neuropsychiatric Symptoms and Expenditure on Complementary and Alternative Medicine. *J Clin Psych* (In Press).
334. Echlin PS, Johnson JM, Holmes JD, Tichenoff A, Gray S, Gatavackas H, Walsh J, Middlebro T, Blignaut A, MacIntyre M, Anderson C, *Fredman E, *Mayinger M, Skopelja EN, *Sasaki T, *Bouix S, *Pasternak O, Helmer KG, *Koerte IK, **Shenton ME**, Forwell LA. The Sport Concussion Education Project. A brief report on an educational initiative: from concept to curriculum. *J Neurosurgery* DOI:10.3171/20.4.8 JNS132804, AANS, 2014.
335. *Whitford TJ, *Kubicki M, *Pelavin PE, *Lucia D, *Schneiderman JS, Pantelis C, McCarley RW, **Shenton ME**. Cingulum bundle integrity associated with delusions of control in schizophrenia. *Schizophr Res* (In Press).
336. Nestor PG, Choate V, Niznikiewicz M, Levitt JJ, **Shenton ME**, McCarley RW. Neuropsychology of reward learning and negative symptoms in schizophrenia. *Schizophr Res* (In Press).
337. Yang JC, Papadimitriou G, *Eckbo R, *Yeterian EH, Liang L Dougherty DD, *Bouix S, *Rathi Y, **Shenton M**, *Kubicki M, Eskandar EN, Makris N. Multi-tensor investigation of orbitofrontal cortex tracts affecting subcaudate tractotomy. *Brain Imaging and Beh* DOI/10.1007/s11682-014-9314-z.
338. *Del Re EC, *Spencer KM, Oibe N, Mesholam-Gately R, Goldstein J, **Shenton ME**, Petryshen T, Seidman LJ, McCarley RW, Niznikiewicz MA. Clinical high risk and first episode schizophrenia: Auditory event-related potentials. *Psychiatr Res: Neuroimaging* (In Press).

Proceedings of Meetings:

1. Longabaugh RH, Fowler DR, Stout RL, Kriebel GW, **Shenton ME**, Gabrilowitz M. A classificatory system for identifying problem indicators. In: Ryback R, Longabaugh RH, Fowler DR (eds): *The Problem-Oriented Record in Psychiatry and Mental Health Care*. New York, Grune & Stratton Inc, 1981:219-227.
2. Longabaugh RH, Fowler DR, Stout RL, Kriebel GW, **Shenton ME**, Gabrilowitz M: A dictionary for classifying treatment interventions. In: Ryback R, Longabaugh RH, Fowler DR (eds.): *The Problem-Oriented Record in Psychiatry and Mental Health Care*. New York, Grune & Stratton Inc, 1981:229-237.
3. McCarley RW, Torello M, **Shenton ME**. The topography of P300 and spectral energy in schizophrenics and normals. In: Shagass C, Josiassen RC, Bridger WH, Weiss KJ, Stoff D, Simpson GM, (ed.). *Biological Psychiatry. Proceedings, IVth World Congress of Psychiatry*. Elsevier, 1985:389-391.
4. Faux SF, Torello M, McCarley RW, **Shenton M**, Duffy FH. Altered P200 topography in schizophrenia. In: Rohrbaugh, JW, Johnson Jr., R, and Parasuraman R, (eds): *Eighth International Conference on Event-Related Potentials of the Brain (EPIC VIII): Research Reports*. Stanford, CA, 1986:84-86.
5. Faux SF, **Shenton ME**, McCarley RW, Torello M, Duffy FH. Altered P200 topography in schizophrenia. In: Rohrbaugh, JW, Johnson Jr., R, and Parasuraman R, (eds.): *Eighth International Conference on Event-Related Potentials of the (EPIC VIII): Research Reports*. Stanford, CA, 1986:81-83.
6. Adams J, Faux SF, McCarley RW, *Marcy B, **Shenton ME**. The N400 and language processing in schizophrenia. *Proceedings of the Ninth International Conference on Event Related Potentials of the Brain (EPIC IX Congress)*. 1989:12-13.
7. Faux SF, Nestor PG, McCarley RW, **Shenton ME**, Horvath T, Davis K. P300 asymmetries in unmedicated schizophrenics. In: Bruria CHM, Gaillard AWK, Kok (eds.): *Ninth International Conference on Event-Related Potentials of the Brain (EPIC IX): Research Reports*. Tilberg: Tilberg University Press, Vol. II, 1990:209-212
8. McCarley RW, Faux SF, **Shenton ME**, Nestor PG. P300 asymmetries in schizophrenia: Robustness of topography under linked-ears or nose references. In: Bruria CHM, Gaillard AWK, Kok (eds.) *Ninth International*

Conference on Event-Related Potentials of the Brain (EPIC IX): Research Reports. Tilberg: Tilberg University Press, Volume II, 1990:224-226.

9. Gerig G, Martin J, Kikinis R, Kübler O, **Shenton ME**, Jolesz FA. Automating segmentation of dual-echo MR head data. *Lecture Notes in Computer Science* 1991;511:175-187. [[Abstract](#)]
10. Gerig G, Martin J, Kikinis R, Kuebler O, **Shenton ME**, Jolesz FA. Unsupervised segmentation of 3-D dual-echo MR Head data. In: Butterworth, Special Edition of Image and Vision 35 Computing. 1992, p. 349-360.
11. O'Donnell BF, **Shenton ME**, McCarley RW, Faux SF, Kikinis R, Nestor PG, Jolesz FA. Conjoint left asymmetry of auditory P300 voltage and MRI volume of posterior superior temporal gyrus in schizophrenia: A quantitative evaluation. In: Karmos G, Molnar M, Csepe V, Czigler I, Desmedt JE (eds.) *Perspectives of Event-Related Potentials Research (EEG Suppl. 44)*. Elsevier Science B.V., 1995:387-394.
12. Hirayasu A, *Hokama HH, Ogura C, *Hirayasu Y, *Arakaki H, Matsuo K, Asato N, Nakamoto H, Yamamoto K, McCarley RW, **Shenton ME**, Kikinis R. Relationship between P300 abnormality and superior temporal gyrus reduction in first-onset schizophrenia: A preliminary study. In: Ogura C, Koga Y, Shimokochi M (eds.) *Recent Advances in Event-Related Brain Potential Research*. Elsevier Science B.V., 1996:968-971.
13. *Niznikiewicz MA, Seidman LF, *Dickey CC, *Solinger J, **ME**, McCarley RW. N400 abnormalities during sentence processing in schizotypal and schizophrenic subjects. In: Ogura C, Koga Y, Shimokochi M (eds.) *Recent Advances in Event-Related Brain Potential Research*. Elsevier Science B.V., 1996:1004-1008.
14. O'Donnell BF, *Ohta H, McCarley RW, *Hokama HH, Wible CG, *Law S, Nestor PG, Kikinis R, Jolesz FA, **Shenton ME**. The auditory P3a and P3b ERP components in schizophrenia: Relationship to frontal and temporal lobe MRI volumes. In: Ogura C, Koga Y, Shimokochi M (eds.) *Recent Advances in Event-Related Brain Potential Research*. Elsevier Science B.V., 1996:30-35.
15. Ettinger GJ, Leventon ME, Grimson WEL, Kikinis R, Gugino V, Cote W, Sprung L, Aglio L, **Shenton ME**, *Potts G, Alexander E. Experimentation with a Transactions cranial Magnetic Stimulation System for Functional Brain. *Proceedings of CVRMED* 1997:477-486.
16. Golland P, Kikinis R, Umans C, Halle, M, **Shenton ME**, Richolt JM. Anatomy browser: A framework for integration of medical information. *Med Image Comput Comput Asst Interv* 1998;720-731.(In: Lecture Notes in Computer Science, Eds. Wells WM, Colchester A, and Delp S, Springer-Verlag, 1998.)
17. *Potts GF, Wible CG, **Shenton ME**, Weinstein DM, *Fisher I, Leventon ME, Gugino LD, McCarley RW. Localization of visual cortex with coregistered functional magnetic resonance imaging, bioelectrically modeled cortical visual evoked potential, and transcranial magnetic stimulation induced visual suppression. *J of Cognitive Neuroscience* (Suppl.), p.42, 1998.
18. Golland P, Grimson WEL, **Shenton ME**, Kikinis R. Small sampling size learning for shape analysis of anatomical structures. *Med Image Comput Comput Asst Interv* 2000;1935:72-78. [[full text](#)]
19. Golland P, Kikinis R, Halle M, Umans C, Grimson WEL, **Shenton ME**, Richolt JA. Anatomy Browser: A Novel Approach to Visualization and Integration of Medical Information. *Yearbook of Medical Informatics 2001*, Eds. R. Haux and C. Kulikowski, 414-428, Schattauer, Germany, 2001.
20. Golland P, Grimson WEL, **Shenton ME**, Kikinis R. Deformation analysis for shape based classification. *IPMI* 2001;517-530. [[full text](#)]
21. O'Donnell L, Westin CF, Grimson WEL, Ruiz-Alzola J, **Shenton ME**, Kikinis R. Phase-based user-steered image segmentation. *Med Image Comput Comput Asst Interv* 2001;1022-1030. [[full text](#)]

22. Ferrant M, Cuisenaire O, Macq BM, Thiran J-P, **Shenton ME**, Kikinis R, Warfield SK. Surface based atlas matching of the brain using deformable surfaces and volumetric finite elements. *Med Image Comput Comput Asst Interv* 2001;2208:1352-1353. [[full text](#)]
23. Gerig G, Styner M, **Shenton ME**, Lieberman JA. Shape versus size: Improved understanding of the morphology of brain structures. *Med Image Comput Comput Asst Interv* 2001;2208:24-32. [[full text](#)]
24. Rexilius R, Warfield SK, Guttman CRG, Wei X, Benson R, Wolfson L, **Shenton ME**, Handels H, Kikinis R. A novel nonrigid registration algorithm and applications. *Med Image Comput Comput Asst Interv* 2001;2208:923-931. [[full text](#)]
25. Timoner SJ, Golland P, Kikinis R, **Shenton ME**, Grimson WEL, Wells WM III. Performance issues in shape classification. *Med Image Comput Comput Asst Interv* 2002;2488:355-362. [[full text](#)]
26. Golland P, Fischl B, Spiridon M, Kanwisher N, Buckner RL, **Shenton ME**, Kikinis R, Dale AM, Grimson WEL. Discriminative analysis for image-based studies. *Med Image Comput Comput Asst Interv* 2002;2488:508-515. [[full text](#)]
27. Pohl KM, Wells WM III, Guimond A, *Kasai K, **Shenton ME**, Kikinis R, Grimson WEL, Warfield SK. Incorporating non-rigid registration into expectation maximization algorithm to segment MR images. *Med Image Comput Comput Asst Interv* 2002;2488:564-572. [[full text](#)]
28. Liu Y, Teverovskiy L, Carmichael O, Kikinis R, **Shenton ME**, Carter CC, Stenger VA, Davis S, Aizenstien H, Becker JT, Lopes OL, Meltzer CC. Discriminative MR image feature analysis for automatic schizophrenia and Alzheimer's disease classification. *Med Image Comput Comput Asst Interv* 2004;3217:393-401. [[full text](#)]
29. *Bouix S, *Ungar L, *Dickey CC, McCarley RW, **Shenton ME**. Evaluating Automatic Brain Tissue Classifiers. *Med Image Comput Comput Asst Interv* 2004;3217:1038-1039. [[full text](#)]
30. *Brun A, Knutsson H, *Park HJ, **Shenton M**, Westin CF. Clustering fiber traces using normalized cuts. *Med Image Comput Comput Asst Interv* 2004;3217:368-375. PMCID: [PMC3296487](#)
31. Haidar H, *Bouix S, *Levitt J, McCarley RW, **Shenton ME**, Soul JS. An Elliptic PDE Approach for shape characterization. In *Proceedings of The 26th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, Sep 2004, San Francisco, USA. PMCID: [PMC2791903](#)
32. Haidar H, *Bouix S, *Levitt JJ, *Dickey C, McCarley RW, **Shenton ME**, Soul JS. Characterizing the shape of anatomical structures with Poisson's equation. *Med Image Comput Comput Asst Interv* 2004;3217:266-273. [[full text](#)]
33. *Park H, **Shenton ME**, Westin CF. An analysis tool for quantification of Diffusion Tensor MRI. *Med Image Comput Comput Asst Interv* 2004;3217:1089-1090. [[full text](#)]
34. *Niethammer M, Estepar RSJ, *Bouix S, **Shenton ME**, Westin CF. On Diffusion Tensor Estimation. *IEEE Engineering in Medicine and Biology Society* 2006;2622-2625. PMCID: [PMC2791793](#)
35. Styner M, Oguz I, Xu S, Brechbuhler C, Pantazis D, *Levitt J, **Shenton M**, Gerig G. Framework for the statistical shape analysis of brain structures using SPHARM-PDM. *Med Image Comput Comput Asst Interv* 2006;1071:242-25. [[full text](#)]
36. San Jose Estepar R, Kubicki M, **Shenton M**, Westin CF. A kernel-based approach for user-guided fiber bundling using diffusion tensor data. *Conf Proc IEEE Eng Med Biol Soc* 2006;1:2626-2629. PMCID: [PMC2768065](#)

37. Nain D, Styner M, *Niethammer M, *Levitt JJ, **Shenton ME**, Gerig G, Bobick A, Tannenbaum A. Statistical shape analysis of brain structures using spherical wavelets. *IEEE Symposium on Biomedical Imaging, ISBI* 2007;4:209-212. PMCID: [PMC2771415](#)
38. *Rathi Y, Michailovich O, *Bouix S, **Shenton ME**. Directional Functions for Orientation Distribution Estimation. In: *International Symposium on Biomedical Imaging* 2008;927-930. [[Abstract](#)]
39. *Rathi Y, Dambreville S, *Niethammer M, Malcolm J, *Levitt JJ, **Shenton ME**, Tannenbaum A. Segmenting images analytically in shape space. In: *SPIE Conference on Medical Imaging* 2008; Volume 6914. [[Abstract](#)]
40. *Rathi Y, Michailovich O, *Bouix S, **Shenton ME**. Orientation Distribution Estimation for Q-Ball Imaging. In: *IEEE Workshop on Tensor Processing in Computer Vision*. CVPR, 2008. [[full text](#)]
41. Michailovich O, *Rathi Y, **Shenton ME**. On approximation of orientation distributions by means of spherical ridgelets. In: *International Symposium on Biomedical Imaging* 2008;939-942. [[Abstract](#)]
42. *Spencer KM, *Niznikiewicz MA, Nestor PG, **Shenton ME**, McCarley RW. Left auditory cortex gamma synchronization and auditory hallucination symptoms in schizophrenia. *BMC Neurosci* 2009;10:85. PMCID: [PMC2719648](#)
43. Malcolm JG, **Shenton ME**, *Rathi Y. Two-tensor tractography using a constrained filter. *Med Image Comput Comput Assist Interv* 2009;12(Pt1):894-902. PMCID: [PMC2893231](#) (Oral presentation.)
44. Malcolm J, **Shenton ME**, *Rathi Y. Neural Tractography Using An Unscented Kalman Filter. In: *Information Processing in Medical Imaging (IPMI)*, 2009. PMCID: [PMC2768602](#) (Oral presentation.)
45. Malcolm J, **Shenton ME**, *Rathi Y. Filtered Tractography: Validation on a Physical Phantom. In: *Workshop on Diffusion Modeling and Fiber Cup. MICCAI*, 2009. [[full text](#)]
46. Malcolm J, **Shenton ME**, *Rathi Y. The Effect of Local Fiber Model on Population Studies. In: *Workshop on Diffusion Modeling and Fiber Cup. MICCAI*, 2009. [[full text](#)]
47. *Rathi Y, Malcolm JG, *Bouix S, Kindlmann G, Westin C-F, *Kubicki M, **Shenton ME**. Mixture Model for estimating fiber ODF and multi-directional Tractography. In: *International Society For Magnetic Resonance in Medicine Scientific Meeting* 2009;17:3548. [[full text](#)] [[PowerPoint](#)]
48. *Rathi Y, Malcolm J, *Bouix S, Westin C-F, **Shenton ME**. Disease Classification: A probabilistic Approach. In: *International Symposium on Biomedical Imaging* 2010;1345-1348. [[full text](#)]
49. *Rathi Y, Malcolm J, Michailovich O, McCarley R, Westin CF, **Shenton ME**. Biomarkers for identifying first episode schizophrenia patients using diffusion weighted imaging. *Med Image Comput Comput Asst Interv* 2010;13(Pt1):657-665. PMCID: [PMC3091029](#)
50. *Rathi Y, Malcolm JG, *Bouix S, Westin C-F, **Shenton ME**. False Positive Detection using Filtered Tractography. In: *International Society For Magnetic Resonance in Medicine Scientific Meeting* 2010;18:4019. [[full text](#)]
51. *Ng HP, *Kubicki M, Malcolm J, *Rathi Y, *Pelavin P, McCarley RW, **Shenton ME**. Diffusion two-tensor tractography study on inter-hemispheric connection between bilateral Heschl gyrus in schizophrenia. In: *International Society For Magnetic Resonance in Medicine Scientific Meeting*. 2010;18:2430. [[full text](#)]
52. *Savadjiev P, Westin C-F, Rausch AC, Maddah M, *Bouix S, **Shenton ME**, *Kubicki M. Tractorientated parameterization of left uncinate geometry abnormalities in schizophrenia. In Human Brain Mapping (Barcelona, Spain), June, 2010.

53. *Savadjiev P, *Kubicki M, *Bouix S, Kindlmann GL, Shenton ME, Westin C-F. Tract-based parameterization of local white matter geometry. In International Society for Magnetic Resonance in Medicine Conference (Stockholm, Sweden), May, 2010.
54. *Savadjiev P, *Rathi Y, Malcolm JG, **Shenton ME**, Westin C-F. A geometry-based particle filtering approach to white matter tractography. *Med Image Comput Comput Asst Interv* (MICCAI) 2010;6362:233-240.
55. *Wasserman D, *Rathi Y, *Bouix S, *Kubicki M, Kikinis R, **Shenton ME**, Westin C-F. White matter bundle registration and population analysis based on Gaussian processes. *Inf Processing in Med Imaging, 22nd International Conference IPMI*, Kloster Irsee, Germany, July 3-8, 2011;22:320-32. PMCID: [PMC3140022](#)
56. *Rathi Y, Michailovich O, Bouix S, **Shenton ME**, Westin C-F. Sparse multi-shell diffusion imaging, *International Conference on Medical Image Computing and Compute Assisted Intervention* (MICCAI), 2011.
57. Baumgartner C, Michailovich O, *Pasternak O, *Bouix S, *Levitt J, **Shenton ME**, Westin C0F, Rathi Y. A unified tractography framework for comparing diffusion models in clinical scans. In: *Workshop on Computational Diffusion MRI (CDMRI)*, 2012.
58. *Savadjiev P, *Rathi Y, **Shenton ME**, *Bouix S, Westin C-F. Multi-scale characterization of white matter tract geometry. In: *International Society for Magnetic Resonance in Medicine Conference* (Melbourne, Australia), May, 2012.
59. *Pasternak O, **Shenton ME**, Westin C-F. Estimation of extracellular volume from regularized multi-shell diffusion MRI. In: *Medical image computing and computer Assisted Intervention* (MICCAI), Part II LNCS; 2012. 7511: 305-312.
60. *Pasternak O, *Bouix S, *Rathi Y, Branch C, Westin C-F, **Shenton ME**, Lipton M. Identification of Mild Traumatic Brain Injuries by Comparison of Free-Water Corrected z-Distributions, *Proceeding of the 21th International Society for Magnetic Resonance in Medicine meeting (ISMRM)*, Salt-Lake City, UT, 2013.
61. *Pasternak O, *Bouix S, *Rathi Y, Branch CA, Westin C-F, **Shenton ME**, Lipton M. Characterization of Diffusion MRI Abnormalities using a Joint Distribution Normative Atlas, *International Society for Magnetic Resonance in Medicine Workshop on Diffusion as a Probe of Neural Tissue Microstructure*, Croatia, 2013.
62. *Wasserman D, Makris N, *Rathi Y, **Shenton M**, Kikinis R, *Kubicki M, Westin C-F. On describing human white matter anatomy: The white matter query language. *Med Image Comput Comput Assist Interv* 2013.
63. *Rathi Y, Ning L, Michailovich O, Liao H, Grant PE, Gagoski B, Stern R, **Shenton ME**, Westin C-F, Lin A. Maximum entropy estimation of Glutamate and Glutamine in MR spectroscopic imaging, in: *Medical Image Computing and Computer Assisted Intervention* (MICCAI), 2014.

Reviews, Chapters, Books, and Other Publications:

1. **Shenton ME**. The problem and treatment code. *Problem Systems and Treatment* 1978;1:2 (published quarterly by Butler Hospital).
2. **Shenton ME**, Longabaugh R. Coding Manual for the Butler Hospital code for psychiatric problems and treatments. *JSAS Catalog of Selected Documents in Psychology* 1981;11:(MS# 2209).
3. Holzman PS, Solovay MR, **Shenton ME**. Thought disorder specificity in functional psychoses. In: Alpert M, (ed.): *Controversies in Schizophrenia: Change and Constancies*. New York: New York, Guilford Press, 1985:228-250.

4. *Cane MB, Faux SF, **Shenton ME**, McCarley RW, Duffy FH. Temporal region alterations in P300 topography in schizophrenia: An introduction to Brain Electrical Activity Mapping (BEAM). *Resident and Staff Physician*. 1987;33(1):110-121. [[Abstract](#)]
5. Gerig G, Martin J, Kikinis R, Kübler O, **Shenton ME**, Jolesz FA. Automating Segmentation of dual-echo MR head data. In: Colchester ACF, and Hawkes DJ (eds.) *Lecture Notes in Computer Science Series*. Heidelberg: Verlag-Springer press, 1991. [[Abstract](#)]
6. **Shenton ME**, Kikinis R. Spotlight: 1992 recipients use satellite technology to study brain abnormalities in schizophrenia. *The Decade of the Brain: The National Alliance for the Mentally Ill*. 1994;5(1): Spring, 1994.
7. **Shenton ME**. Temporal lobe structural abnormalities in schizophrenia: A selective review and presentation of new MR findings. In: Levy D, Matthysee S, Benes F, Kagan J (eds.) *Psychopathology: The Evolving Science of Mental Disorders*. Cambridge University Press 1996:51-99. [[Cambridge Books Online](#)]
8. **Shenton ME**, Wible CG, McCarley RW. MRI studies in schizophrenia. In: Krishnan KRR, Doraiswamy PM (Eds.) *Brain Imaging in Clinical Psychiatry*. Marcel Dekker, Inc. 1997:297-380.
9. Wible CG, **Shenton ME**, McCarley RW. Neuroanatomy of the limbic system and the planum temporale. In: Krishnan KRR, Doraiswamy PM (Eds.) *Brain Imaging in Clinical Psychiatry*. Marcel Dekker, Inc. 1997:63-101
10. Gugino LD, *Potts GF, Aglio LS, Alexander E, Grimson WEL, Kikinis R, **Shenton M**, Black PM, Ettinger GJ, Cote WA, Leventon M, Sprung LJ. Localization of eloquent cortex using transcranial magnetic stimulation. In: Alexander III E and Maciunas RJ (Eds.). *Advanced Neurosurgical Navigation*. New York: Thieme Press, 1998:163-199.
11. **Shenton ME**, *Frumkin M, McCarley RW, Maier SE, Westin CF, *Fischer IA, *Dickey C, Kikinis R. Morphometric Magnetic Resonance Imaging studies: Findings in Schizophrenia. In: Dougherty DD, Rauch SL (Eds.). *Psychiatric Neuroimaging Research: Contemporary Strategies*. American Psychiatric Association, 2001;1-60.
12. Maier S, **Shenton ME**, Jolesz FA. Diffusion MRI explores new indications. *Diagnostic Imaging, Advanced MR Supplement* 2001;December:2-6. [[full text](#)]
13. *Niznikiewicz MA, *Kubicki M, **Shenton ME**. Recent structural and functional imaging findings in schizophrenia. *Current Opin Psychiatry* 2003;16(2):123-147. [[full text](#)]
14. **Shenton ME**. Diffusion tensor imaging: An innovative technique to study white matter pathology in schizophrenia. (Tele-Lecture) *The Journal of Psychotic Disorders* 2004;8:10-12.
15. *Kubicki M, McCarley RW, **Shenton ME**. Evidence for white matter abnormalities in schizophrenia. *Current Opin Psychiatry* 2005;18:121-134. [PMC2768599](#)
16. **Shenton ME**. Schizophrenia: A complex disorder that has stymied research efforts to uncover its origin. *Harvard Health Policy Review* 2005;6(2):46-53. [[full text](#)]
17. Finn CT, Funke B, *Kikinis Z, **Shenton M**, Schiripo T. Frontiers in Biological Psychiatry. Exploring the Relationship Among Genes, Brain Development, and the Emergence of Psychopathology. In: *Psychiatric Manifestations of Velocardiofacial Syndrome*. Arlington, VA: American Psychiatric Publishing, Inc; 2007.
18. McCarley RW, *Nakamura M, **Shenton ME**, *Salisbury DF. Combining ERP and structural MRI information in first episode schizophrenia and bipolar disorder. *Clin EEG Neurosci* 2008;39(2):57-60. [PMC2770258](#)

19. *Kubicki M, **Shenton ME**. DTI and Its Application to Schizophrenia and Related Disorders. In: *Imaging Brain Pathways – Diffusion MRI: from Quantitative Measurement to In-Vivo Neuroanatomy*. (Editors: H. Johansen-Berg and T. Behrens), Elsevier/Academic Press; 2009:251-270.
20. **Shenton ME**, *Kubicki M. Structural Brain Imaging in Schizophrenia. In: *Kaplan and Sadock's Comprehensive Textbook of Psychiatry* (Ninth edition): Edited by Benjamin J. Sadock, M.D., Virginia A. Sadock, M.D., and Pedro Ruiz, M.D., Lippincott Williams, and Wilkins; 2009:1494-150.
21. **Shenton ME**, *Whitford TJ, *Kubicki M. Structural neuroimaging in schizophrenia: From methods to insights to treatments. *Dialogues in Clinical Neuroscience* 2010;12(3):269-332. PMCID: [PMC3181976](#)
22. **Shenton ME** and Turetsky BI (Editors). *Understanding Neuropsychiatric Disorders: Insights from Neuroimaging*. Cambridge University Press; 2011.
23. *Whitford TJ, *Kubicki M, **Shenton ME**. Neuroanatomical underpinnings of schizophrenia: A review of structural and diffusion imaging findings in schizophrenia. In: *Understanding NeuroPsychiatric Disorders: Insights from Neuroimaging*. (Editors: M.E. Shenton and B.I. Turetsky), Cambridge University Press; 2011, 1-29.
24. **Shenton ME**. Interview: Understanding Schizophrenia and traumatic brain injury using MRI. *Imaging Med* 2013;5(2):111-118.
25. **Shenton ME**. Comment on Small et al. paper entitled “PET scanning of brain Tau in retired national football league players: Preliminary findings presented in Am J Geriatric Psychiatry 2013;21:138e144. In *Alzheimer Research Forum*, January 23, 2013 www.alzform.org/pap/annotation.asp?powID=142265
26. *Fitzsimmons J, *Kubicki M, **Shenton ME**. Review of functional and anatomical brain connectivity findings in schizophrenia. *Curr Opin Psychiatry* 2013;26(2):172-187. PMID: [23324948](#)
27. *Kubicki M, Westin C-F, *Pasternak O, **Shenton ME**. Diffusion tensor imaging and its application to schizophrenia and related disorders. In: *Diffusion MRI: From Quantitative Measures to In-Vivo Neuroanatomy*, Editors: H. Johansen-Berg and T.E.J. Behrens, 2nd Edition, Elsevier Publishers, Academic Press; 2014:317-334.
28. *Kubicki M, **Shenton ME**. Diffusion tensor imaging findings and their implications in schizophrenia. *Curr Opin Psychiatry* 2014;27(3):179-184.
29. *Kubicki M, Westin CF, Pasternak O, **Shenton ME**. Diffusion Tensor Imaging and Its Application to Schizophrenia and Related Disorders. In: *Diffusion MRI: From Quantitative Measurement to In-Vivo Neuroanatomy*. (2nd Edition, Editors: Heidi Johansen-Berg, Timothy E. J. Behrens), Elsevier/Academic Press, 2014.
30. Mulert C, **Shenton ME** (Editors). *MRI in Psychiatry*. Springer, Berlin, Heidelberg, Germany, 2014.
31. *Pasternak O, Fritzsche K, Baumgartner C, **Shenton ME**, *Rathi Y, Westin C-F. The estimation of free-water corrected diffusion tensors. In: *Visualization and Processing of Tensors and Higher Order Descriptions for Multi-Valued Data*. (Editors: C-F Westin, A Vilanova, B Burgeth), Springer, Berlin, Heidelberg, German (In Press).
32. *Whitford TJ, *Kubicki M, **Shenton ME**. Diffusion tensor imaging, structural connectivity and schizophrenia. *US Radiology* (In Press).
33. *Koerte I, Lin A, *Muehlmann M, Rauchmann B-S, Cooper K, *Mayinger M, Stern RA, **Shenton ME**. Post-traumatic cognitive disorders. In: Kanekar Sangam (Ed) *Imaging of Neurodegenerative Diseases*. Thieme Publishers (In Press).
35. *Koerte I, *Hufschmidt J, *Muehlmann M, **Shenton ME**. Neuroimaging. In: Laskowitz, Grant (Editors) *Frontiers in Neuroscience - Translational Research in Traumatic Brain Injury*. Taylor & Francis (In Press).

36. Shenton ME, *Kubicki M, and Makris N. Commentary: Understanding alterations in brain connectivity in attention-deficit/hyperactivity disorder using imaging connectomics. *Biol Psychiatry* 2014;76:601-602.

Thesis:

Doctoral Dissertation entitled, "Thought Disorder in Psychotic Patients and Their Families", presented in partial fulfillment of the doctoral requirements, Department of Psychology, Harvard University (1984).

Dissertation Advisor: Professor Philip Holzman, Ester and Sidney Rabb Professor of Psychology. Dissertation Committee Members: Professors Philip Holzman, Brendan Maher, Steve Matthysee, David McClelland, and James Stellar.

Nonprint Materials:

The Anatomy Browser is a JAVA-based interactive teaching tool for learning human neuroanatomy. It enables the user to manipulate three-dimensional (3D) neuroanatomical models (derived from MR images) interactively on personal computers without specialized rendering hardware. The user can view models of the brain from several angles and can select structures to be annotated by name. The Anatomy Browser includes a hierarchical list of structures that can be expanded or collapsed in order to control the level of detail displayed. Currently there are more than 100 labeled neuroanatomical structures. The Anatomy Browser also enables the user to remove structures in order to view hidden structures and to control the level of opacity of selected structures. Additionally, the browser provides a cross-reference between the 3D model and three different cross-sections of the original MR image (i.e., sagittal, coronal, and axial). These interactive features, along with the browser's accessibility on the World Wide Web (<http://splweb.bwh.harvard.edu:8000/pages/java.html>), make it a valuable tool for teaching neuroanatomy. Other applications, based on the labeled neuroanatomical models, include: neurosurgical planning, and the automatic identification and delineation of neuroanatomical structures in new MR scans using warping techniques which use the list of structures as the template for warping the same structures in new MR scans.

Abstracts:

- A1. McCarley RW, Torello M, **Shenton ME**, Duffy F. The P300 and spectral topography in schizophrenics and normals. *International J of Neuroscience* 1987;32(102):446-447.
- A2. O'Donnell BF, **Shenton ME**, McCarley RW, *Pollak SD, Faux SF, Nestor PG, *Smith RS. P3 and TDI scores in families of schizophrenics. *American Psychiatric Association New Research Abstracts* 1991.
- A3. **Shenton ME**, Kikinis R, McCarley RW, Anderson M, *Pollak SD, Metcalf D, Hanlon W, Jolesz FA. Computer-assisted volumetric measurements of MR brain images in schizophrenia. *Schizophr Res* 1991;4(3):413-413.
- A4. *Chou IH, **Shenton ME**, Benes F, Wible CG, Kikinis R, Jolesz FA, McCarley RW. A magnetic resonance imaging study of the cingulate gyrus in schizophrenia. *Biol Psychiatry* 1993;33(6A):A123-A123.
- A5. *Chou I, **Shenton ME**, Benes F, Kikinis R, Jolesz FA, McCarley RW. Cingulate gyrus and schizophrenia. *American Psychiatric Association New Abstracts* 1993:130.
- A6. *Niznikiewicz M, O'Donnell BF, McCarley RW, *Smith L, *Hokama H, *Salisbury D, *Kimble M, **Shenton ME**. Habituation in auditory P3-amplitude and alpha-power in normal and schizophrenic subjects. *Biol Psychiatry* 1993;33(6A):A118-A118.
- A7. O'Donnell BF, *Kimble M, McCarley RW, *Salisbury DF, Nestor PG, **Shenton ME**. Aging, chronicity, and auditory event-related potential abnormalities in schizophrenia. *Biol Psychiatry* 1993;33(6A):A118-A118.
- A8. Nestor PG, **Shenton ME**, O'Donnell B, McCarley RW, *Haimson J, *Kimble M. Converging evidence for a left temporal-lobe dysfunction in schizophrenia. *Biol Psychiatry* 1993;33(6A):A119-A119.

- A9. Wible CG, **Shenton ME**, *Hokama H, Kikinis R, Jolesz FA, McCarley RW. A magnetic-resonance-imaging study of the prefrontal cortex in schizophrenia. *Biol Psychiatry* 1993;33(6A):A123-A123.
- A10. **Shenton M**, Kikinis R, Wible CG, *Hokama H, Jolesz FA, McCarley RW. Alterations in left temporal and temporal-lobe gyral pattern in schizophrenia. *Biol Psychiatry* 1993;33(6A):A123-A123.
- A11. Wible CG, **Shenton ME**, Oshio K, Kikinis R, Jolesz FA, McCarley RW. High-resolution MR-imaging of the hippocampal region in schizophrenia: A new methodology with preliminary results. *Biol Psychiatry* 1994;35(9):722S-723S.
- A12. *Levitt JJ, O'Donnell BF, Nestor PG, **Shenton ME**, McCarley RW. EP and neuropsychological correlates of premorbid adjustment in schizophrenia. *Biol Psychiatry* 1994;35(9):617S-617S.
- A13. O'Donnell BF, **Shenton ME**, McCarley RW, Faux SF, *Kimble M, *Salisbury DF, Kikinis R, Jolesz FA. MRI and ERP evidence for a neurodegenerative course in schizophrenia. *Biol Psychiatry* 1994;35(9):704S-704S.
- A14. *Hokama H, **Shenton ME**, Kikinis R, Jolesz FA, McCarley RW. Basal ganglia volume in schizophrenia – An MR study. *Biol Psychiatry* 1994;35(9):721S-721S.
- A15. **Shenton ME**, *Hokama H, Kikinis R, *Ballard R, *Holinger DP, Galaburda A, Jolesz FA, McCarley RW. Use of 3D MR surface renderings for measuring planum temporale. *Biol Psychiatry* 1994;35(9):721S-721S.
- A16. **Shenton ME**, *Hokama H, Kikinis R, Wible CG, Jolesz FA, McCarley RW. Atlas of the human brain from MR data – A new teaching and research resource. *Biol Psychiatry* 1994;35(9):721S-721S.
- A17. Nestor PG, **Shenton ME**, Wible CG, *Kimble M, *Smith L, Kikinis R, McCarley RW. Neuropsychological correlates of MRI measures in schizophrenia. *Biol Psychiatry* 1994;35(9):722S-722S.
- A18. Wible CG, **Shenton ME**, *Hokama H, Kikinis R, Jolesz FA, McCarley RW. Relationships between temporal and frontal brain volume in schizophrenics. *Biol Psychiatry* 1994;35(9):722S-722S.
- A19. *Dickey CC, Voglmaier MM, **Shenton ME**, Seidman LJ, *Salisbury DF, *Niznikiewicz M, *Sollinger J, Kikinis R, Jolesz FA, McCurley (sic) RW. Schizotypal disorder – Cognitive, behavioral, and neuropathological indicators. *Biol Psychiatry* 1995;37(9):597S-597S.
- A20. *Salisbury DF, **Shenton ME**, McCarley RW, Yurgelun-Todd DA, Tohen M, Sherwood AR. P3 topography differs in schizophrenia-like and mania-like first episode psychosis. *Biol Psychiatry* 1995;37(9):626S-626S.
- A21. *Ohta H, O'Donnell BF, McCarley RW, *Hokama H, Wible CG, **Shenton ME**, *Law SE, *Karapelou ME, Nestor PG, Jolesz FA, Kikinis R. An ERP study of the auditory P3A and P3B components in schizophrenia. *Biol Psychiatry* 1995;37(9):630S-631S.
- A22. O'Donnell BF, Swearer JM, McCarley RW, *Smith LT, **Shenton ME**, Nestor PG. Selective deficits in visual-perception and recognition in schizophrenia. *Biol Psychiatry* 1995;37(9):631S-631S.
- A23. *Salisbury DF, **Shenton ME**, McCarley RW, Yurgelun-Todd DA, Tohen M, Sherwood AR, *Fischer IA, Chase EA. Abnormal P3 topography in 1st-episode schizophrenia-like psychosis. *Psychophysiology* 1995;32:S66-S66(Suppl.).
- A24. Wible CG, **Shenton ME**, Kikinis R, Jolesz FA, McCarley RW. Prefrontal subdivisions, temporal-lobe, and schizophrenia – An MRI study. *Biol Psychiatry* 1995;37(9):683S-683S.
- A25. Coleman MJ, **Shenton ME**, Shapiro BM, Erlenmeyer-Kimling L. Thought-disorder profiles in offspring of schizophrenic parents in the New-York High-Risk Project. *Schizophr Res* 1995;15(1-2):8-8.

- A26. Nestor PG, **Shenton ME**, Wible C, *Hokama H, O'Donnell BF, *Law S, *Karapelou M, Kikinis R, Jolesz FA, McCarley RW. Schizophrenia thought MRI correlates. *Schizophr Res* 1995;15(1-2):91-91.
- A27. **Shenton ME**, *Hokama HH, Kikinis R, *Dickey C, Lorensen WE, *Ballard M (sic), *Holinger D, Galaburda A, Jolesz FA, McCarley RW. A 3D MRI study of the planum temporale in schizophrenia. *Schizophr Res* 1995;15(1-2):98-98.
- A28. Wible CG, **Shenton ME**, *Hokama H, Kikinis R, Jolesz F, McCarley RW. Prefrontal cortex and schizophrenia – A volumetric study of discrete portions of prefrontal cortex using high-resolution MRI. *Schizophr Res* 1995;15(1-2):103-104.
- A29. *Salisbury DF, **Shenton ME**, McCarley RW, Yurgelun-Todd DA, Tohen M. Asymmetrical P3 topography in first episode schizophrenia-like psychosis. *Schizophr Res* 1995;15(1-2):184-185.
- A30. *Salisbury DF, *Fischer IA, **Shenton ME**, Sherwood AR, *Mazzoni P, McCarley RW. Midline P3 amplitude interactions in schizophrenia and mania. *Psychophysiology* 1996;33:S72-S72 (Suppl.).
- A31. McCarley RW, **Shenton ME**, O'Donnell BF, *Dickey CC, Greene RW. Schizophrenic disorders: Neurodevelopmental and onset vulnerability factors. *Biol Psychiatry* 1996;39(7):9S-9S.
- A32. *Hirayasu H, **Shenton ME**, *Dickey CC, *Salisbury DF, *Fischer IA, Sherwood AR, Yurgelun-Todd DA, Tohen M, McCarley RW. Brain CSF volume in patients with first-episode psychosis. *Biol Psychiatry* 1996;39(7):69S-69S.
- A33. Wible CF, **Shenton ME**, Kikinis R, Jolesz F, McCarley RW. Schizophrenic symptoms and specific regions of prefrontal cortex. *Biol Psychiatry* 1996;39(7):150S-150S.
- A34. Voglmaier MM, **Shenton ME**, McCarley RW, Seidman LJ, *Salisbury D, *Sollinger J. Thought disorder index (TDI) in schizotypal personality disorder. *Biol Psychiatry* 1996;39(7):166S-166S.
- A35. *Potts GF, O'Donnell B, **Shenton ME**, *Allard J, McCarley RW. Auditory and visual high density ERP studies in schizophrenia. *Biol Psychiatry* 1996;39(7):230S-230S.
- A36. *Niznikiewicz MA, Nestor PG, O'Donnell BF, *Allard JE, **Shenton ME**, McCarley RW. Working memory as a factor in language dysfunction in schizophrenia. *Biol Psychiatry* 1996;39(7):240S-240S.
- A37. *Dickey CC, **Shenton ME**, *Hirayasu Y, *Niznikiewicz M, *Fischer I, *Rhoades R, Voglmaier MM, Seidman L, McCarley RW. Schizotypal personality disorder: A MRI analysis of the whole brain. *Biol Psychiatry* 1996;39(7):346S-346S.
- A38. *Levitt JJ, *Donnino R, **Shenton ME**, Kikinis R, Jolesz FA, McCarley RW. A quantitative volumetric MRI study of the brainstem and cerebellum in schizophrenia. *Biol Psychiatry* 1996;39(7):475S-475S.
- A39. *Donnino R, **Shenton ME**, *Iosifescu D, *Hirokazu O (sic), Wible CG, Kikinis R, Jolesz FA, McCarley RW. The parietal lobes in schizophrenia: A quantitative MR study. *Biol Psychiatry* 1996;39(7):476S-476S.
- A40. *Iosifescu DV, **Shenton ME**, Kikinis R, Dengler J, Warfield SK, McCarley RW. Automated measurement of subcortical brain MR structures in schizophrenia. *Biol Psychiatry* 1996;39(7):477S-477S.
- A41. *Salisbury DF, **Shenton ME**, McCarley RW, Sherwood AR, *Fischer IA. Reduced long-latency positive activity in schizophrenia on a homograph task. *Biol Psychiatry* 1996;39(7):522S-522S.
- A42. *Niznikiewicz MA, Nestor PG, O'Donnell BF, Seidman L, *Dickey CC, *Allard JE, *Rhoades R, McCarley RW, **Shenton ME**. ERPs as a probe of language processing difficulties in schizophrenia spectrum disorders. *Biol Psychiatry* 1996;39(7):524S-524S.

- A43. *Iosifescu DV, **Shenton ME**, Kikinis R, Warfield SK, Dengler J, McCarley RW. Elastically matching an MR-imaging brain atlas onto a new MR image of the brain. *Radiology* 1996;197:450-450 (Suppl.).
- A44. Berezovskaya AL, *Salisbury DF, **Shenton ME**, *Fischer IA, *Mazzoni P, McCarley RW. Relative alpha power abnormalities in schizophrenia and manic psychosis. Fifth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry, March 12, 1997.
- A45. Wible CG, **Shenton ME**, Kikinis R, Jolesz FA, McCarley RW. A method for separately measuring the volume of the hippocampus and amygdala using MRI. Poster presented at the Fourth Annual Meeting of the *Cognitive Neuroscience Society*. March 23-25, Boston, MA, 1997.
- A46. Seidman LJ, Voglmaier MM, *Niznikiewicz M, *Dickey CC, *Sollinger J, *Rhoads R, **Shenton ME**, McCarley RW. Delayed and object alternation deficits in schizotypal personality disorder. *Schizophr Res* 1997;24:(1-2):125S-125S.
- A47. Wible CG, **Shenton ME**, Kikinis R, Jolesz FA, McCarley RW. A new non-landmark based method for measuring amygdala and hippocampal volumes using MRI. Poster presented at *Biol Psychiatry* 1997;41:43S-43S.
- A48. McCarley RW, **Shenton M**, Greene R, O'Donnell B, Nestor P, Wible C, *Salisbury D, *Niznikiewicz M, *Hirayasu Y, *Dickey C, *Kwon JS, Tohen M, Yurgelun-Todd D, *Holinger D, Kikinis R, Jolesz F. Schizophrenia: MRI, electrophysiological, and cellular data bearing on some current issues and controversies. *Biol Psychiatry* 1997;41:17S-17S.
- A49. *Dickey CC, **Shenton ME**, Voglmaier M, *Hirayasu Y, *Niznikiewicz M, Seidman L, *Fischer I, *Teh E, *Kisler T, *Rhoads R, *Sollinger J, McCarley RW. Morphologic and cognitive indicators of schizotypal personality disorder. *Biol Psychiatry* 1997;41:25S-25S.
- A50. *Levitt JJ, *Donnino R, **Shenton ME**, Kikinis R, Jolesz FA, McCarley RW. An MRI study of brainstem, cerebellar and vermian structures in schizophrenia. *Biol Psychiatry* 1997;41:34S-34S.
- A51. Nestor PG, Barnard J, O'Donnell BF, **Shenton ME**, Kikinis R, Jolesz FA, Shen Z, Bookstein FL, McCarley RW. Partial least squares analysis of MRI and neuropsychological measures in schizophrenia. *Biol Psychiatry* 1997;41:51S-51S.
- A52. *Hirayasu Y, **Shenton ME**, *Salisbury DF, *Fischer IA, *Dickey CC, *Kisler T, *Arakaki H, Yurgelun-Todd DA, Tohen M, McCarley RW. MRI and ERP abnormalities in first episode psychosis. *Biol Psychiatry* 1997;41:205S-205S.
- A53. *Salisbury DF, **Shenton ME**, Yurgelun-Todd D, Tohen M, McCarley RW. Left temporal P3 reductions in chronic and first episode schizophrenia. *Biol Psychiatry* 1997;41:224S-224S.
- A54. *Salisbury DF, **Shenton ME**, *Fischer IA, *Mazzoni P, McCarley RW. Abnormal ERP activity despite normal performance to homographs in schizophrenia. *Biol Psychiatry* 1997;41:279S-279S.
- A55. Voglmaier MM, Seidman LJ, *Salisbury D, **Shenton M**, *Dickey C, *Niznikiewicz M, *Sollinger J, *Rhodes R, *Teh E, McCarley RW. Verbal skill deficits in schizotypal personality disorder. *Biol Psychiatry* 1997;41:S351-S351.
- A56. *Dickey CC, Voglmaier MM, **Shenton ME**, *Niznikiewicz M, Seidman LJ, *Fischer IA, Teh E, *Rhoads RA, McCarley RW. MRI and cognitive correlates in schizotypal personality disorder. *Schizophr Res* 1997;24(1-2):143-143.
- A57. *Hirayasu Y, **Shenton ME**, *Salisbury DF, *Fischer IA, *Dickey CD, *Arakaki H, Yurgelun-Todd DA, Tohen M, McCarley RW. MRI and ERP abnormalities in first episode schizophrenia and affective disorder. *Schizophr Res* 1997;24(1-2):148-148.

- A58. *Kwon JS, **Shenton ME**, *Hirayasu Y, *Fischer IA, McCarley RW. The MRI study of cavum septi pellucii in schizophrenia and affective disorder. *Schizophr Res* 1997;24(1-2):150-150.
- A59. *Niznikiewicz M, Voglmaier M, Seidman L, **Shenton ME**, *Dickey C, *Rhoads R, *Teh E, McCarley RW. Event-related potential and cognitive evidence for similar language impairments in schizophrenia and schizotypal personality disorder. *Schizophr Res* 1997;24(1-2):235-236.
- A60. *Salisbury DF, Sherwood AR, **Shenton ME**, *Fischer IA, Yurgelun-Todd DA, Tohen M, McCarley RW. Temporal P300 asymmetry in first episode schizophrenia. *Schizophr Res* 1997;24(1-2):237-237.
- A61. *Salisbury DF, *Fischer IA, **Shenton ME**, Sherwood AR, *Mazzoni P, McCarley RW. Temporal P300 asymmetry in schizophrenia vs. manic psychosis and controls. *Schizophr Res* 1997;24(1-2):237-237.
- A62. *Frumin M, *Hirayasu Y, Golland P, *Salisbury DF, *Fisher IA, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. Post-acquisition brain realignment and resampling. *Sixth Annual Research Day, Harvard Medical School*. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry, April 22, 1998.
- A63. Voglmaier MM, Seidman LJ, *Niznikiewicz M, *Dickey CC, **Shenton ME**, *Teh E, McCarley RW. Gender differences in cognitive function in schizotypal personality. *American Psychiatric Association New Research Abstracts* 1998:192.
- A64. Voglmaier MM, Seidman LJ, *Niznikiewicz M, *Dickey CC, **Shenton ME**, *Teh E, McCarley RW. Sex differences in cognitive function in schizotypal personality disorder. *Biol Psychiatry* 1998;43:115S-115S.
- A65. *Potts GF, Weinstein DM, O'Donnell BF, **Shenton ME**, Johnson CR, McCarley RW. Bioelectric modeling of the P300 in schizophrenia. *Biol Psychiatry* 1998;43:119S-119S.
- A66. *Potts GF, **Shenton ME**, Wible CG, Weinstein DM, Leventon ME, Gonzalez A, *Fischer IA, *Kisler T, Gugino L, Kikinis R, McCarley RW. Coregistration of ERP, fMRI, and TMS in a finite-element volume conductivity head model constructed from the structural MRI. Poster presented at the *XIIth International Conference on Event-Related Potentials of the Brain (EPIC XII)*, July 20, 1998, Cambridge, MA.
- A67. *Teh E, *Niznikiewicz M, Voglmaier M, Seidman L, *Dickey C, **Shenton ME**, McCarley RW. Abnormal lexical processes in schizotypy indexed by event-related potentials. Poster presented at the *XIIth International Conference on Event-Related Potentials of the Brain (EPIC XII)*, July 23, 1998, Cambridge, MA.
- A68. *Fischer IA, **Shenton ME**, McCarley RW, Harper M, *Salisbury DF. Abstraction ability and P300 in chronic and first episode psychotic patients. Poster presented at the *XIIth International Conference on Event-Related Potentials of the Brain (EPIC XII)*, July 23, 1998, Cambridge, MA.
- A69. Rutherford BR, **Shenton ME**, McCarley RW, *Fischer IA, *Salisbury DF. Response mode affects P300 topography. Poster presented at the *XIIth International Conference on Event-Related Potentials of the Brain (EPIC XII)*, July 23, 1998, Cambridge, MA.
- A70. Wible CG, *Potts GF, Weinstein DM, Kacher D, Wells W, Sperling R, Cavenaugh G, Yoo SS, **Shenton ME**, *Fischer IA, Leventon ME, Gugino LD, Kikinis R, Jolesz FA, McCarley RW. Co-registration and comparison of functional localization using results from functional MRI (fMRI) transcranial magnetic stimulation (TMS), and ERP with bioelectrically modeled source localization. Poster presented at the *Society for Neuroscience*, November 4, 1998, Los Angeles, CA.
- A71. *Potts GF, Wible CG, **Shenton ME**, Weinstein DM, *Fischer IA, Leventon ME, Gugino LD, McCarley RW. Localization of visual cortex with coregistered functional magnetic resonance imaging, bioelectronically modeled cortical visual evoked potential, and transcranial magnetic stimulation induced visual suppression. *J Cognitive Neuroscience* 1998;(Suppl.):42-42.

- A72. *Levitt JJ, *Donnino R, **Shenton ME**, *Petrescu C, Nestor PG, Kikinis R, Jolesz FA, McCarley RW. Posterior fossa structure in schizophrenia: A quantitative volumetric MRI study. *Biol Psychiatry* 1998;43:72S-72S.
- A73. Wible CG, **Shenton ME**, Kikinis R, Jolesz FA, McCarley RW. Prefrontal cortex volume in chronic schizophrenia: An MRI replication study. *Biol Psychiatry* 1998;43:87S-87S.
- A74. *Dickey CC, **Shenton ME**, Voglmaier MM, *Niznikiewicz MA, Seidman LJ, *Teh E, *Kisler T, *Fischer I, *Hirayasu Y, McCarley RW. Males and females with schizotypal personality disorder. *Biol Psychiatry* 1998;43:172S-172S.
- A75. *Hirayasu Y, **Shenton ME**, *Salisbury DF, Wible CG, *Fischer IA, *Kisler T, *Kwon JS, *Dickey CC, Yurgelun-Todd DA, Tohen M, McCarley RW. Subgenual prefrontal cortex reduction in first episode affective psychosis. *Biol Psychiatry* 1998;43:323S-323S.
- A76. *Hirayasu Y, **Shenton ME**, *Salisbury DF, *Fischer IA, *Kisler T, *Kwon JS, *Dickey CC, Yurgelun-Todd DA, Tohen M, McCarley RW. Superior temporal gyrus change over time in first episode schizophrenia. *Biol Psychiatry* 1998;43:387S-387S.
- A77. *Niznikiewicz MA, **Shenton ME**, Voglmaier M, Seidman L, *Dickey C, *Delong ES, McCarley RW. Language processing as indexed by the N400 in schizotypal personality disorder in females. *Biol Psychiatry* 1998;43:395S-395S.
- A78. *Potts GF, Weinstein DM, O'Donnell BF, **Shenton ME**, Johnson CR, McCarley RW. Bioelectric modeling of the P300 in schizophrenia. *Biol Psychiatry* 1998;43:396S-396S.
- A79. Nestor PG, *Akdag SJ, O'Donnell BF, *Niznikiewicz M, *Law S, **Shenton ME**, McCarley RW. Word recall in schizophrenia: A connectionist model. *Biol Psychiatry* 1998;43:400S-400S.
- A80. *Salisbury DF, *Fischer IA, **Shenton ME**, *Mazzoni P, McCarley RW. Evidence for a selective bias towards strong associates in schizophrenic language. *Biol Psychiatry* 1998;43:407S-407S.
- A81. *Salisbury DF, *Mazzoni P, McCarley RW, *Fischer IA, Tohen M, Yurgelun-Todd DA, **Shenton ME**. P300 asymmetry persists at retest in first psychotic episode schizophrenia. *Biol Psychiatry* 1998;43:408S-408S.
- A82. **Shenton ME**, *Hirayasu Y, *Salisbury DF, *Dickey CC, *Kwon JS, *Niznikiewicz MM, Wible CG, Nestor PG, McCarley RW. Clinical and structural abnormalities in schizophrenia. *Schizophr Res* 1998;29(1-2):82-82.
- A83. Voglmaier MM, Seidman LJ, *Niznikiewicz M, *Dickey CC, **Shenton ME**, McCarley RW. Schizotypal personality disorder: Language and gender. *American Psychiatric Association New Research Abstracts* 1999;128.
- A84. Voglmaier MM, Seidman LJ, *Niznikiewicz M, *Dickey CC, **Shenton ME**, McCarley RW. Language skills in men and women with schizotypal personality disorder. *Biol Psychiatry* 1999;45:31S-31S.
- A85. DeSantis MA, **Shenton ME**, McCarley RW, *Salisbury DF. Background noise affects P300 in first episode psychosis and controls. *Biol Psychiatry* 1999;45:38S-38S.
- A86. Wible CC, *Potts GF, Weinstein DM, Kacher D, Wells W, Sperling R, Cavenaugh G, Yoo SS, *Fischer IA, Leventon ME, Gugino LD, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. Localization of motor function using results from functional MRI (fMRI), transcranial magnetic stimulation (TMS), and ERP with bioelectrically modeled source localization. *Biol Psychiatry* 1999;45:131S-131.
- A87. *Fraone SK, **Shenton ME**, *Dickey CC, *Hirayasu Y, *Niznikiewicz MA, Voglmaier MM, Seidman LJ, *Sutton J, *Frumkin M, McCarley RW. Trend toward reduced Heschl's gyrus volume in SPD. *Seventh Annual Research Day, Harvard Medical School*. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry, April 1999.

- A88. Huh TJ, Nestor PG, *Kimble M, **Shenton ME**. Dissociation of working memory in schizophrenia. Poster presented at the *Fourteenth Annual Meeting of the Society for Research in Psychopathology*, November 18, 1999, Montreal, Québec, Canada.
- A89. *Potts GF, Weinstein DM, Gugino LG, Gonzalez A, Wible C, McCarley RW, Tucker DM, Kikinis R, **Shenton ME**. Localizing the functional central sulcus with 128 channel motor and somatosensory evoked potentials in an MRI derived finite-element head model. *J of Cognitive Neuroscience* 1999;94-94 (Suppl.)
- A90. McCarley RW, *Salisbury DF, *Hirayasu Y, Wible C, **Shenton ME**. Conjoint structural MRI and ERP studies in schizophrenia: Evidence for a “hot spot” of dominant hemisphere abnormalities that is present at onset and also progresses. *Psychophysiology* 1999;36:S13-S13.
- A91. *Niznikiewicz M, Voglmaier M, **Shenton M**, *Dickey C, Seidman L, *Teh KK, *Sutton J, McCarley RW. Differential lexical processing in normal and schizotypal individuals. *Psychophysiology* 1999;36:S86-S86.
- A92. *Salisbury DF, **Shenton ME**, Tohen M, Zarate C, McCarley RW. P300 topography during the early course of psychosis. *Psychophysiology* 1999;36:S100-S100.
- A93. *Niznikiewicz MA, Nester PG, O'Donnell BF, Voglmaier M, **Shenton ME**. N400 and schizophrenia spectrum disorders. *International J Psychophysiology* 1999;33(1):54-54.
- A94. McCarley RW, *Hirayasu Y, O'Donnell BF, *Niznikiewicz MA, *Potts GF, *Kwon JS, Gainski JL, *Anderson JE, **Shenton ME**. Neurophysiological and structural MRI studies in schizophrenia. *International J Psychophysiology* 1999;33(1):58-58.
- A95. *Potts GF, **Shenton ME**, Wible CG, Weinstein DM, Leventon ME, Gonzalez AA, *Fischer IA, *Kisler T, Gugino LD, Kikinis R, McCarley RW. Coregistration of ERP, fMRI, and TMS in a finite-element volume conductivity head model constructed from the structural MRI. *International J Psychophysiology* 1999;33(1):103-103.
- A96. *Niznikiewicz MA, **Shenton M**, Voglmaier M, Seidman L, *Dickey C, *Teh E, *Delong S, McCarley RW. N400 amplitude indexes language abnormality in female schizotypy. *International J Psychophysiology* 1999;33(1):182-182.
- A97. *Teh E, *Niznikiewicz M, Voglmaier (sic) M, Seidman L, *Dickey C, **Shenton ME**, McCarley RW. Abnormal lexical processes in schizotypy indexed by event-related potentials. *International J Psychophysiology* 1999;33(1):183-183.
- A98. *Fischer IA, **Shenton ME**, McCarley RW, Harper M, *Salisbury DF. Abstraction ability and P300 in chronic and in first episode psychotic patients. *International J of Psychophysiology* 1999;33(1):187-187.
- A99. Rutherford BR, **Shenton ME**, McCarley RW, *Fischer IA, *Salisbury DF. Response mode affects P300 topography. *International J Psychopharmacology* 1999;33(1):188-188.
- A100. *Salisbury DF, **Shenton ME**, McCarley RW. Association strength bias in schizophrenia. *International J Psychophysiology* 1999;33(1):191-191.
- A101. **Shenton ME**, *Salisbury DF, McCarley RW. P300 asymmetry is present longitudinally from schizophrenia onset. *International J Psychophysiology* 1999;33(1):192-192.
- A102. *Kwon JS, O'Donnell BF, Wallenstein GV, Greene RW, *Hirayasu Y, Nestor PG, Hasselmo ME, *Potts GF, **Shenton ME**, Gainski JL, McCarley RW. Gamma range amplitude and phase abnormalities to auditory stimulation in schizophrenia. *International J Psychophysiology* 1999;33(1):198-198.

- A103. *Salisbury DF, Farrell D, **Shenton ME**, *Fischer IA, Zarate C, McCarley RW. Mismatch negativity is reduced in chronic but not first episode schizophrenia. *Biol Psychiatry* 1999;45(8):25S-26S.
- A104. **Shenton ME**, Gerig G, McCarley RW, Szekeley G, Kikinis R. Morphometric hippocampal shape differences in schizophrenia. *Biol Psychiatry* 1999;45(8):117S-117S.
- A105. *Hirayasu Y, **Shenton ME**, *Salisbury DF, *Frumkin M, *Fischer IA, Farrell D, Yurgelun-Todd DA, Zarate C, McCarley RW. Progressive change in posterior superior temporal gyrus in schizophrenia. *Biol Psychiatry* 1999;45(8):378S-378S.
- A106. *Dickey CC, **Shenton ME**, *Hirayasu Y, Voglmaier MM, *Niznikiewicz MA, Seidman LJ, *Frumkin M, *Fraone S, *Fischer IA, *Sutton J, *Teh E, McCarley RW. *Biol Psychiatry* 1999;45(8):118S-118S.
- A107. *Levitt JJ, **Shenton ME**, *Dickey CC, Kikinis R, Jolesz FA, McCarley RW. An MRI study of caudate volume in unmedicated schizotypal personality disorder. *Biol Psychiatry* 1999;45(8):131S-131S.
- A108. *Frumkin M, Golland P, McCarley RW, *Hirayasu Y, *Salisbury DF, *Fischer IA, Kikinis R, **Shenton ME**. Shape difference in the corpus callosum in first episode psychosis. *Biol Psychiatry* 1999;45(8):132S-132S.
- A109. *Niznikiewicz M, **Shenton ME**, Voglmaier M, Seidman L, *Dickey C, *Teh E, McCarley RW. Abnormal activation in lexical networks in schizotypy indexed by evoked potentials. *Biol Psychiatry* 1999;45(8):132S-132S.
- A110. O'Donnell BF, McCarley RW, *Potts GF, *Salisbury DF, Nestor PG, *Hirayasu Y, *Niznikiewicz MA, Barnard J, Shen ZJ, Weinstein DM, Bookstein FL, **Shenton ME**. Identification of neural circuits underlying P300 abnormalities in schizophrenia. *Psychophysiology* 1999;36(3):388-398.
- A111. *Dickey CC, **Shenton ME**, *Hirayasu Y, Voglmaier MM, *Niznikiewicz MA, Seidman LJ, *Frumkin M, *Fraone S, *Fischer IA, *Sutton J, *Teh E, McCarley RW. CSF volume differences in schizotypal personality disorder. *Schizophr Res* 1999;36(1-3):195-195.
- A112. *Frumkin M, Golland P, McCarley RW, *Hirayasu Y, *Salisbury DF, *Fischer IA, Kikinis R, **Shenton ME**. Deformation of shape of the corpus callosum in first-episode schizophrenia and affective disorder. *Schizophr Res* 1999;36(1-3):197-197.
- A113. *Kwon JS, McCarley RW, *Hirayasu Y, *Anderson JE, Kikinis R, Jolesz FA, **Shenton ME**. Volume reduction of left planum temporale in chronic schizophrenic patients. *Schizophr Res* 1999;36(1-3):202-202.
- A114. McCarley RW, *Hirayasu Y, *Salisbury DF, *Fischer IA, Yurgelun-Todd DA, Tohen M, **Shenton ME**. Left posterior superior temporal gyrus: Progressive gray matter volume reduction in schizophrenia. *Schizophr Res* 1999;36(1-3):204-205.
- A115. **Shenton ME**, Gerig G, McCarley RW, Szekeley G, Kikinis R. Hippocampal shape differences in schizophrenia. *Schizophr Res* 1999;36(1-3):210-210.
- A116. McCarley RW, *Kwon JS, O'Donnell BF, Nallenstein GV, Greene RW, Hasselmo ME, *Hirayasu Y, Nestor PG, **Shenton ME**. Gamma frequency amplitude and phase abnormalities to auditory stimulation in schizophrenia. *Schizophr Res* 1999;36(1-3):255-256.
- A117. *Niznikiewicz MA, **Shenton M**, *Dickey CC, Voglmaier MM, Seidman LJ, *Teh E, *Rhoads R, McCarley RW. Auditory P3 deficit in schizotypal personality disorder. *Schizophr Res* 1999;36(1-3):257-257.
- A118. *Salisbury DF, **Shenton ME**, *Fischer IA, *Mazzoni P, Farrell DC, Tohen M, Zarate C, McCarley RW. Longitudinal study of P300 topography in first-episode schizophrenia. *Schizophr Res* 1999;36(1-3):258-258.

- A119. *Dickey CC, **Shenton ME**, *Fraone S, *Niznikiewicz MA, Voglmaier MM, Seidman LJ, *Hirayasu Y, *Kwon JS, *Fischer IA, *Anderson J, *Frumkin M, McCarley RW. Reduced left Heschl's gyrus volume in schizotypal personality disorder. *Biol Psychiatry* 2000;47(8):44S-44S.
- A120. Voglmaier MM, Seidman LJ, *Niznikiewicz M, *Dickey CC, **Shenton ME**, *Sutton J, McCarley RW. Thought disorder and language in schizotypal personality disorder. *Biol Psychiatry* 2000;47(8):69S-69S.
- A121. *Salisbury DF, Rutherford B, **Shenton ME**, McCarley RW. Does response mode affect detection of P300 asymmetry in schizophrenia? *Biol Psychiatry* 2000;47(8):80S-80S.
- A122. *Hirayasu Y, **Shenton ME**, *Tanaka S, *Salisbury DF, *Nagy A, *Dickey CC, *Kricun A, Yurgelun-Todd DA, Zarate C, McCarley RW. Specificity of reduced cortical gray matter to first episode schizophrenic psychosis. *Biol Psychiatry* 2000;47(8):341S-341S.
- A123. McCarley RW, *Dickey CC, *Niznikiewicz MA, Seidman L, Voglmaier MM, *Salisbury DF, *Sutton J, **Shenton ME**. Structural MR imaging findings in schizotypal personality disorder. *Biol Psychiatry* 2000;47(8):394S-394S.
- A124. *Levitt JJ, McCarley RW, *Ciszewski A, *Dickey CC, Kikinis R, Jolesz FA, **Shenton ME**. Caudate and ventricular volume in unmedicated schizotypal personality disorder. *Biol Psychiatry* 2000;47(8):452S-452S.
- A125. McCarley RW, *Kwon JS, O'Donnell BF, Wallenstein GV, Greene RW, *Hirayasu Y, Nestor PG, Hassel ME, **Shenton ME**. Gamma frequency auditory processing abnormalities in schizophrenia. *Biol Psychiatry* 2000;47(8):569S-569S.
- A126. *Salisbury DF, Rutherford B, **Shenton ME**, McCarley RW. Does response mode affect detection of P300 asymmetry in schizophrenia? *Biol Psychiatry* 2000;47:24S-24S.
- A127. *Frumkin M, Westin CF, Maier SE, *Kubicki M, McCarley RW, Mamata H, *Teh E, **Shenton ME**. White matter abnormalities in schizophrenia. *Eighth Annual Research Day, Harvard Medical School*. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry, April 5, 2000.
- A128. *Kubicki M, Westin CF, Maier SE, McCarley RW, Mamata H, *Frumkin M, Wible CG, *Teh E, Kikinis R, Jolesz FA, **Shenton ME**. Uncinate fasciculus in schizophrenics: A diffusion tensor study. *Eighth Annual Research Day, Harvard Medical School*. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry, Boston 2000.
- A129. *Kricun AA, *Kubicki M, Yoo SS, Kacher D, *Salisbury DF, *Hirayasu Y, **Shenton ME**, McCarley RW, Wible CG. Early auditory processing deficits in schizophrenics: an fMRI study. *Eighth Annual Research Day, Harvard Medical School*. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry, April 5, 2000.
- A130. *Nagy A, *Lee CU, *Kricun AA, *Dickey CC, *Salisbury DF, **Shenton ME**, McCarley RW. Schizophrenia: Progressive prefrontal gray matter changes. *Eighth Annual Research Day, Harvard Medical School*. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry, April 5, 2000.
- A131. *Frumkin M, Westin CF, McCarley RW, Maier S, Mamata H, *Kubicki M, **Shenton ME**. Presentation; White matter abnormalities in schizophrenia. *American Psychiatric Association New Research Abstracts* 2000:84.
- A132. Gurrera RJ, *Niznikiewicz M, Berman E, Nestor P, *Allen C, **Shenton ME**, *Dodd C. Auditory P3 and personality traits in schizophrenia. *American Psychiatric Association New Research Abstracts* 2000:161.
- A133. *Nagy AI, *Lee CU, **Shenton ME**, *Salisbury DF, *Kricun AA, *Dickey CC, McCarley RW. Presentation; Schizophrenia: Progressive prefrontal gray matter changes. *American Psychiatric Association New Research Abstracts* 2000:83.

- A134. *Kubicki M, Westin CF., McCarley R.W., Kikinis R. Jolesz F.A., Maier S., Mamata H., **Shenton ME**. Cingulum bundle in schizophrenics-Diffusion tensor study. *RSNA 86th Scientific Assembly and Annual Meeting*, Chicago, 2000. *Radiology* 2000;217:402.
- A135. *Frumin M, Westin CF, McCarley RW, *Kubicki M, *The E, *Allen C, **Shenton ME**. Using diffusion tensor imaging to examine the corpus callosum in schizophrenia. *The 39th Annual Meeting of the American College of Neuropsychopharmacology*, December 14, 2000, Jan Juan, Puerto.
- A136. *Niznikiewicz M, *Spencer KM, **Shenton ME**, Voglmaier M, Seidman L, *Dickey C, *Frumin M, *Sutton J, Friedman M, McCarley RW. Early priming effects in schizotypal personality disorder as demonstrated with spatiotemporal principal components analysis. *Psychophysiology* 2000;37:S75-S75.
- A137. *Salisbury DF, Rutherford B, **Shenton ME**, McCarley RW. Button pressing reduces P300 and changes its topography. *Psychophysiology* 2000;(37):S850S85.
- A138. *Frumin M, Westin CF, Maier S, McCarley RW, *Kubicki M, *Teh E, **Shenton ME**. Corpus callosum abnormalities in schizophrenia as measured by diffusion imaging. *Schizophr Res* 2001;49(Suppl.):154-154.
- A139. *Kubicki M, Westin CF, Maier S, Mamata H, *Frumin M, Jolesz FA, McCarley RW, **Shenton ME**. Fronto-temporal white matter connections in schizophrenia, a diffusion tensor MR study. *ASNR 39th Annual Meeting*, 21-27 April 2001, Boston, MA
- A140. **Shenton ME**, *Kubicki M, Westin CF, Maier S, *Frumin M, Mamata H, McCarley RW. Disruption of the integrity within the cingulum bundle in schizophrenic subjects: MR diffusion tensor study. *Schizophr Res* 2001;49(Suppl.):166-166.
- A142. Voglmaier MM, Seidman LJ, *Niznikiewicz MA, *Dickey CC, **Shenton ME**, McCarley RW. Schizotypal personality disorder: Cognition, language, and thought disorder. *Biol Psychiatry* 2001;49:271S-271S.
- A143. McCarley RW, *Kubicki M, *David E, *Salisbury D, **Shenton ME**. Voxel based morphometry analysis of gray matter in first episode schizophrenia. *Annual Meeting of American Psychiatric Association, New Research Abstracts*; 2001:89.
- A144. *Kubicki M, **Shenton ME**, *David E, *Frumin M, *Salisbury D, *Hirayasu Y, McCarley RW. A comparison of voxel-based morphometry (VBM) with region-of-interest (ROI) analysis of gray matter in control and first episode schizophrenia subjects. *Biol. Psychiatry*, 2001;49:125S-125S.
- A145. *Kubicki M, Westin CF, Maier S, *Frumin M, McCarley RW, **Shenton ME**. Integrity of the Limbic System in Schizophrenic Subjects- Cingulum Bundle MR Diffusion Tensor Study. *Biol. Psychiatry*, 2001;49:125S-125S.
- A146. *Kubicki M, Westin CF, Maier S, Mamata H, *Frumin M, *Teh E, McCarley RW, **Shenton ME**. Diminished asymmetry within frontal-temporal connections in schizophrenics, a diffusion tensor study. *Schizophr Res* 2001; (Suppl.);9:159-159.
- A147. Griggs CB, **Shenton ME**, McCarley RW, *Salisbury DF. Neuropsychological correlates of subordinate homograph disambiguation. *Psychophysiology* 2001;38(Suppl.):S45-S45.
- A148. McCarley RW, Wible C, *Salisbury D, *Niznikiewicz M, *Hirayasu Y, *Spencer K, **Shenton M**. Liking brain function and structure in schizophrenia: Structural MRI, fMRI and ERP data on auditory mismatch negativity and P300. *International J Psychophysiology* 2001;41(3):204-204.
- A149. *Dickey CC, McCarley RW, Voglmaier MM, *Niznikiewicz MA, Seidman LJ, *Frumin M, **Shenton ME**. MRI measures of prefrontal gray and white matter in males and females diagnosed with schizotypal personality disorder. *Schizophr Res* 2001;49(1-2):153-153.

- A150. McCarley RW, *Dickey CC, *Fraone S, *Niznikiewicz MA, *Hirayasu Y, Volgmaier MM, **Shenton ME**. Reduced left Heschl's gyrus volume in schizophrenia spectrum disorder using structural MRI. *Schizophr Res* 2001;49(1-2):160-161.
- A151. *Kasai K, **Shenton ME**, *Salisbury DF, *Lee CU, *Dickey CC, Yurgelun-Todd D, McCarley RW. Fusiform gyrus volume reduction in first-episode schizophrenia. *Biol Psychiatry* 2001;49(8):64S-64S.
- A152. *Levitt JJ, McCarley RW, *Ciszewski A, *Salisbury DF, Kikinis R, Jolesz FA, **Shenton ME**. An MRI study of caudate nucleus and lateral ventricle volume in first episode schizophrenia. *Biol Psychiatry* 2001;49(8):203S-203S.
- A153. *Niznikiewicz MA, *Spencer K, **Shenton ME**, Voglmaier M, Seidman L, *Dickey C, *Frumin M, *Friedman M, McCarley RW. Semantic overactivation present early in schizotypal personality disorder: Evidence from principal components analysis. *Biol Psychiatry* 2001;49(8):228S-228S.
- A154. *Dickey C, McCarley RW, Voglmaier M, *Niznikiewicz M, *Frumin M, Seidman L, **Shenton ME**. Neurobiology of schizotypal personality disorder. *Biol Psychiatry* 2001;49(8):244S-244S.
- A155. *Dickey CC, **Shenton ME**, Voglmaier MM, *Niznikiewicz MA, Seidman LJ, *Frumin M, *Fraone S, Ahn S, *Madan A, McCarley RW. Prefrontal cortex in schizotypal personality disorder males and females. *Biol Psychiatry* 2001;49(8):336S-336S.
- A156. Voglmaier MM, Seidman LJ, *Niznikiewicz MA, *Dickey CC, **Shenton ME**, McCarley RW. Schizotypal personality disorder: Cognition, language, and thought disorder. *Biol Psychiatry* 2001;49(8):271S-271S.
- A157. *Salisbury DF, Bonner-Jackson A, Griggs CB, **Shenton ME**, McCarley RW. Mismatch negativity in schizophrenia: Does MMN amplitude decline with disease duration? *Biol Psychiatry* 2001;49(8):296S-296S.
- A158. *Frumin M, Westin CF, McCarley RW, *Kubicki M, *Teh E, *Allen C, Maier SE, **Shenton ME**. White matter abnormalities in schizophrenia using diffusion tensor imaging: A study of the corpus callosum. *Biol Psychiatry* 2001;49(8):337S-337S.
- A159. *Niznikiewicz M, Han SD, Nestor P, *Dodd C, **Shenton M**, McCarley RW. When word-level and paragraph-level collide. *International J Psychophysiology* 2001;41(3):228S-228S.
- A160. *Kubicki M, *Fitchorov T, Westin CF, *Frumin M, *Ersner-Hershfield H, Jolesz FA, McCarley RW, **Shenton ME**. White matter abnormalities in schizophrenia: Evidence from diffusion tensor and myelin saturation techniques. *Biol Psychiatry* 2002;51(8):169S-169S.
- A161. *Frumin M, Westin CF, Maier S, *Kubicki M, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. A diffusion tensor imaging study of the corpus callosum in schizophrenia. *Biol Psychiatry* 2002;51(8):139S-139S.
- A162. Voglmaier MM, Seidman LJ, *Madan A, *Niznikiewicz MA, *Dickey CC, **Shenton ME**, McCarley RW. Dichotic sentence identification and semantic facilitation in schizotypal personality Disorder. *Biol Psychiatry* 2002;51(8):64S-64S.
- A163. *Onitsuka T, **Shenton ME**, *Kasai K, Nestor PG, McCarley RW. Fusiform gyrus volume reduction and facial recognition in chronic schizophrenia. *Biol Psychiatry* 2002;51(8):75S-75S.
- A164. *Levitt JJ, McCarley RW, Westin CF, Estepar RS, Kikinis R, Jolesz FA, **Shenton ME**. An MRI of the shape of the caudate nucleus in schizotypal personality disorder. Poster presentation at *The 41st Annual Meeting of the American College of Neuropsychopharmacology*, December 2002, Jan Juan, Puerto.
- A165. *Salisbury D, **Shenton ME**, McCarley RW. Reduction of MMN in the first few years of schizophrenia. *Psychophysiology* 2002;39:S73-S73.

- A166. *Kubicki M, Westin CF, Maier S, *Frumkin M, Nestor P, *Salisbury D, Kikinis R, Jolesz F, McCarley RW, **Shenton ME**. Uncinate fasciculus findings in schizophrenia: A magnetic resonance diffusion tensor imaging study. *Schizophr Res* 2002;53(3):88-88.
- A167. *Kubicki M, **Shenton ME**, *Salisbury DF, Hirayasu Y, McCarley RW. Voxel-based morphometric analysis of gray matter in first episode schizophrenia. *Schizophr Res* 2002;53(3):96-96.
- A168. McCarley RW, **Shenton ME**, *Kasai K, *Hirayasu Y, *Salisbury DF. Progression of gray matter loss after first-episode in schizophrenia but not in bipolar psychosis. *Biol Psychiatry* 2002;51(8):31S-31S.
- A169. *Salisbury DF, **Shenton ME**, McCarley RW. Age and chronicity effects on P300 amplitude in schizophrenia and psychotic mania. *Biol Psychiatry* 2002;51(8):133S-133S.
- A170. *Dickey CC, McCarley RW, Voglmaier M, *Niznikiewicz M, *Toner S, *Demeo S, Seidman L, *Frumkin M, **Shenton ME**. Structural MRI study of fusiform gyrus gray matter in schizotypal personality disorder. *Biol Psychiatry* 2002;51(8):164S-164S.
- A171. *Levitt JJ, McCarley RW, *Ersner-Hershfield H, *Salisbury DF, Kikinis R, Jolesz FA, **Shenton ME**. An MRI study of caudate nucleus and lateral ventricle volume in first episode schizophrenia and affective psychosis. *Biol Psychiatry* 2002;51(8):175S-175S.
- A172. *Ersner-Hershfield H, *Levitt JJ, McCarley RW, *Kubicki M, Westin CF, Kikinis R, Jolesz F, **Shenton ME**. An MRI diffusion tensor imaging study of the anterior limb of the internal capsule. *Eleventh Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry*, Boston 2003.
- A173. *Kubicki M, Westin CF, *Frumkin M, *Ersner-Hershfield H, Jolesz F, McCarley RW, **Shenton ME**. DTI and MTR Abnormalities in Schizophrenia- Voxel Wise Analysis of White Matter Integrity. *Schizophr Res* (Suppl.) 2003;60:199-199.
- A174. *Park HJ, Westin CF, *Brun A., *Kubicki M, McCarley RW, and **Shenton ME**. A method for hemispheric asymmetry of white matters using diffusion tensor MRI. *Human Brain Mapping* 2003, New York, USA, In: *Neuroimage*, 2003;S:918.
- A175. *Schwartz DP, *Dickey CC, Panych LP, **Shenton ME**, Yoo S-S, *Toner SK, Wible CG, Jolesz F, Kikinis R, McCarley RW. fMRI Activation of the Superior Temporal Gyrus in Schizotypal Personality Disorder. *Eleventh Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Department of Psychiatry*, March 19, 2003.
- A176. *Onitsuka T, *Niznikiewicz MA, **Shenton ME**, Nestor PG, *Lucia LC, McCarley RW. Schizophrenia is associated with deficits in the neural network for face processing. *Eleventh Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Department of Psychiatry*, March 19, 2003.
- A177. *Ersner-Hershfield H, *Levitt JJ, McCarley RW, *Kubicki M, Westin CF, Kikinis R, Jolesz FA, **Shenton ME**. An MRI diffusion tensor imaging study of the anterior limb of the internal capsule. *Eleventh Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Department of Psychiatry*, March 19, 2003.
- A178. *Park, HJ, **Shenton ME**, *Kubicki M, McCarley RW. Statistical probability atlas map of first episode schizophrenia, *Eleventh Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Department of Psychiatry*, March 19, 2003.
- A179. *Wiegand LC, Warfield SK, *Levitt JJ, *Hirayasu Y, *Salisbury DF, Heckers S, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. Prefrontal Cortical Thickness in Schizophrenia: An MRI Study. *Eleventh Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Department of Psychiatry*, March 19, 2003.

- A180. *Demeo S, *Dickey CC, **Shenton ME**, *Frumin M, *Niznikiewicz MA, Voglmaier M, Seidman LJ, *Madan A, McCarley RW. Superior Temporal Gyrus in Females with Schizotypal Personality Disorder: A Quantitative MRI Study. Eleventh Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Department of Psychiatry, March 19, 2003.
- A181. *Allen CG, Nestor PG, McCarley RW, **Shenton ME**. Retrieval induced forgetting assessing associative memory in schizophrenia. *Schizophr Res* 2003;60(1):121-121 Suppl.
- A182. Nestor PG, *Kubicki M, **Shenton ME**, *Allen CG, *Niznikiewicz MA, McCarley RW. Diffusion tensor Imaging correlates of learning and memory in chronic schizophrenia. *Schizophr Res* 2003;60(Suppl.):150-151.
- A183. *Dickey C, McCarley RW, Voglmaier M, *Niznikiewicz M, Seidman LJ, *Demeo SS, *Ersner-Hershfield H, *Schwartz DP, *Frumin M, **Shenton ME**. Odd speech and the superior temporal gyrus in females with schizotypal personality disorder: A MRI study. *Schizophr Res* 2003;60(Suppl.):193-193.
- A184. *Kubicki M, Westin CF, *Frumin M, *Ersner-Hershfield H, Jolesz FA, McCarley RW, **Shenton ME**. DTI and MTR abnormalities in schizophrenia- voxel wise analysis of white matter integrity. *Schizophr Res* 2003;60(Suppl.):199-199.
- A185. *Niznikiewicz MA, Hun SD, Nestor PG, *Dodd C, **Shenton ME**, McCarley RW. Processing of word-level and paragraph-level information in schizotypy. *Schizophr Res* 2003;60(Suppl.):256-257.
- A186. *Salisbury DF, *Kasai K, **Shenton ME**, McCarley RW. Mismatch negativity amplitude and Heschl's gyrus volume in first-episode schizophrenia. *Schizophr Res* 2003;60(Suppl.):259-259.
- A187. *Park HJ, **Shenton ME**, *Kubicki M, McCarley RW. Spatial distribution of temporal lobe subregions in first episode schizophrenia: Statistical probability atlas approach. *Human Brain Mapping* 2003, New York, June 21.
- A188. *Park HJ, Westin CF, *Kubicki M, *Brun A, McCarley RW, **Shenton ME**. A method for hemispheric asymmetry of white matter using diffusion tensor MRI. *Human Brain Mapping* 2003, New York, June 21.
- A189. *Kubicki M, *Park HJ, Westin CF, Mulkern R, *Frumin M, *Connor E, Jolesz FA, McCarley RW, **Shenton ME**. White matter integrity in schizophrenia – A DTI and MTR voxel based analysis. *The 42nd Annual Meeting of the American College of Neuropsychopharmacology*, December 8, 2003, Jan Juan, Puerto.
- A190. *Levitt JJ, McCarley RW, Westin CF, Nestor P.G., Estepar R.S.J., Kikinis R., Jolesz F.A., **Shenton ME**. Shape of the caudate nucleus in schizotypal personality disorder: an MRI study. Paper presented at the *Society of Biological Psychiatry Annual Meeting*, May 15-May 17, 2003, San Francisco, CA. *Biol Psychiatry* 2003;53(8):327S-327S.
- A191. *Levitt, JJ, McCarley RW, Westin CF, Nestor PG, Kikinis R, Jolesz FA, **Shenton ME**. Caudate Nucleus in Schizotypal Personality Disorder: An MRI Shape Study. Paper presented at the *American Psychiatric Association Meeting*, May 17-May 22, 2003, San Francisco, CA.
- A192. *Levitt JJ, McCarley RW, *Ersner-Hershfield H, *Kubicki M, Westin CF, Kikinis R, Jolesz FA, **Shenton ME**. Fiber Disorder in Schizophrenia: A DTI study of thalamo-cortical connections. Paper presented at the *American College of Neuropsychopharmacology Meeting*, December 7-11, 2003, San Juan, Puerto Rico.
- A193. McCarley RW, *Salisbury D, Wible C, **Shenton ME**. Matching the mismatch in EEG, fMRI and structural MRI data. *Biol Psychiatry* 2003;53(8):18S-18S.
- A194. *Onitsuka T, **Shenton ME**, *Dickey CC, *Kuroki N, Nestor PG, McCarley RW. Middle and inferior temporal gyrus gray matter volume abnormalities in chronic schizophrenia: An MRI study. *Biol Psychiatry* 2003;53(8):332S-332S.

- A195. *Salisbury DF, *Kasai K, **Shenton ME**, McCarley RW. Mismatch negativity and Heschl's gyrus gray matter volume longitudinally in first-episode schizophrenia. *Biol Psychiatry* 2003;53(8):250S-250S.
- A196. *Niznikiewicz MA, *Onitsuka T, **Shenton ME**, *Frumin M, McCarley RW. N400 correlations with brain structures in schizophrenia. *Biol Psychiatry* 2003;53(8):144S-144S.
- A197. *Kubicki M, *Park HJ, Westin CF, Mulkern R, *Frumin M, Connor E, Jolesz FA, McCarley RW, **Shenton ME**. White Matter Integrity in Schizophrenia- DTI and MTR Voxel-Wise Analysis. *Winter Workshop in Schizophrenia*, Davos, Switzerland, 2004.
- A198. *Kuroki N, *Kubicki M, Nestor PG, McCarley RW, *Park HJ, *Levitt JJ, *Woolston S, *Frumin M, *Niznikiewicz M, Westin CF, Maier SE, **Shenton ME**. Fornix integrity and hippocampal volume in schizophrenia. *Biol Psychiatry* 2004;55:72S-73S.
- A199. *Levitt JJ, *Ersner-Hershfield H, *Kubicki M, Westin CF, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. An MR-DTI study of thalamo-cortical connections in schizophrenia. *Biol Psychiatry* 2004;55:126S-126S.
- A200. *Nakamura M, McCarley RW, Maier SE, *Dickey CC, *Kubicki M, Westin CF, *Kuroki N, *Niznikiewicz MA, Seidman LJ, Voglmaier MM, *Connor EE, *Kim SS, **Shenton ME**. Diffusion tensor imaging in schizotypal personality disorder. *Biol Psychiatry* 2004;55:237S-237S.
- A201. *Connor EE, *Ungar LP, *Kubicki M, Nestor PG, Jolesz FA, Kikinis R, McCarley RW, **Shenton ME**. Cingulum Bundle Integrity and Cognitive Inhibition in Schizophrenia. *Twelfth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Department of Psychiatry*, Boston 2004.
- A202. *Kuroki N, *Kubicki M, Nestor PG, McCarley RW, *Park HJ, *Levitt JJ, *Woolston S, *Frumin M, *Niznikiewicz M, Westin CF, Maier SE, **Shenton ME**. Fornix and Hippocampus in Schizophrenia: A Diffusion Tensor Imaging and Structural MRI Study. *Twelfth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Department of Psychiatry*, Boston, 2004.
- A203. *Ungar LP, *Connor EE, *Kubicki M, Nestor PG, *Niznikiewicz M, McCarley RW, **Shenton ME**. Stroop and Conflict Monitoring in Healthy Subjects: Evidence from DTI and fMRI. *Twelfth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Department of Psychiatry*, Boston, 2004.
- A204. *Woolston S, *Levitt, JJ, *Kuroki N, *Frumin M, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. An MRI study of the ventromedial striatum in schizophrenia. Twelfth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Department of Psychiatry, March 24, 2004.
- A205. *Levitt JJ, *Ersner-Hershfield H, *Kubicki M, Westin CF, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. An MR-DTI study of thalamo-cortical connections in schizophrenia. Paper accepted for presentation at the *Society of Biological Psychiatry Annual Meeting*, April 29-May 1, 2004, New York, New York.
- A206. *Spencer K, *Kubicki M, *Niznikiewicz MA, Nestor PG, *Frumin M, **Shenton ME**, McCarley RW. Neural synchrony in top-down attentional control: Functional and structural correlates. *Cognitive Neuroscience Society Abstracts*, 2004:S159.
- A207. *Spencer KM, Nestor PG, *Niznikiewicz MA, Valdman O, **Shenton ME**, McCarley RW. Hyperpriming of attention shifting in schizophrenia: experiment and simulation. *International Journal of Psychophysiology*, 2004;54:20.
- A208. *Allen CG, Nestor PG, McCarley RW, **Shenton ME**. Associative memory patterns differ in schizophrenia: A retrieval-induced forgetting paradigm. *The 112th Convention of the American Psychological Association*, July 28, 2004.
- A209. *Koo M, *Levitt JJ, McCarley RW, Seidman LJ, *Dickey CC, *Niznikiewicz MA, Voglmaier MM, *Zamani P, *Long KR, *Kim SS, **Shenton ME**. Caudate nucleus volume and its clinical and cognitive correlates in female

neuroleptic - naive patients with schizotypal personality disorder. *The 34th Annual Meeting of the Society for Neuroscience*, San Diego, CA, October 27, 2004.

- A210. *Dickey CC, McCarley RW, Voglmaier M, *Rose K, *Niznikiewicz MA, *Demeo S, Seidman LJ, **Shenton ME**. Areas of the Paralimbic Belt in Schizotypal Personality Disorder: A Pilot MRI Study. *Biol Psychiatry* 2004;55:20S-20S.
- A211. *Kasai K, Gilbertson MW, **Shenton ME**, Yamasue H, Lasko NB, Orr SP, Pitman RK. Determining structural brain abnormalities predicting vulnerability to psychological trauma. *Biol Psychiatry* 2004;55:228S-228S.
- A212. McCarley RW, **Shenton ME**, *Kasai K, *Kuroki N. Progression of STG gray matter volume decrease in first-episode schizophrenia but not in first episode mania. *Biol Psychiatry* 2004;55:73S-73S.
- A213. *Salisbury DF, *Kuroki N, *Kasai K, **Shenton ME**, McCarley RW. Mismatch negativity as an index of peri-onset cortical reduction in schizophrenia. *Biol Psychiatry* 2004;55:221S-222S.
- A214. *Spencer KM, Perlmutter R, Klump M, *Niznikiewicz MA, Nestor PG, *Frumkin M, **Shenton ME**, McCarley RW. Gamma-band EEG synchrony and hallucinations in schizophrenia. *Biol Psychiatry* 2004;55:207S-207S.
- A215. *Koo M, *Levitt JJ, McCarley RW, Seidman LJ, *Dickey CC, *Niznikiewicz MA, Voglmaier MM, *Zamani P, *Long KR, *Kim SS, **Shenton ME**. Caudate nucleus volume and its clinical and cognitive correlates in female neuroleptic - naive patients with schizotypal personality disorder. Paper presented at the *Society for Neuroscience*, October 22-October 26, 2004, Washington, DC.
- A216. Levitt JJ, McCarley RW, *Ersner-Hershfield H, *Kubicki M, Westin CF, Kikinis R, Jolesz FA, **Shenton ME**. Fiber Disorder in Schizophrenia: A DTI study of thalamo-cortical connections. Paper presented at the *American College of Neuropsychopharmacology Meeting*, December 7-11, 2003, San Juan, Puerto Rico.
- A217. *Dickey CC, **Shenton ME**, Seidman LJ, *Connor E, Voglmaier M, *Niznikiewicz M, *Dreusicke M, McCarley RW. Simple auditory processing in schizotypal personality disorder. Poster presented at the *43rd Annual Meeting of the American College of Neuropsychopharmacology*, December, 2004, San Juan, Puerto Rico. *Neuropsychopharmacology* 2004;29:S79-S79.
- A218. *Kubicki M, *Park HJ, Westin CF, Mulkern R, Maier S, *Niznikiewicz M, *Connor E, *Levitt J, *Frumkin M, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. DTI and MTR abnormalities in schizophrenia: Analysis of white matter integrity. Poster presented at the *43rd Annual Meeting of the American College of Neuropsychopharmacology*, December, 2004, San Juan, Puerto Rico. *Neuropsychopharmacology* 2004;29:S167-S167.
- A219. *Spencer KM, Nestor PG, Perlmutter R, *Niznikiewicz MA, Klump MC, *Frumkin M, **Shenton ME**, McCarley RW. Neural synchrony indexes disordered perception and cognition in schizophrenia. Poster presented at the *43rd Annual Meeting of the American College of Neuropsychopharmacology*, December, 2004, San Juan, Puerto Rico. *Neuropsychopharmacology* 2004;29:S227-S227.
- A220. *Spencer KM, Nestor PG, Perlmutter R, *Niznikiewicz MA, Klump MC, *Frumkin M, **Shenton ME**, McCarley RW. Gamma-band synchrony indexes disordered perception and cognition in schizophrenia. *Psychophysiology* 2004;41:S90-S90.
- A221. *Spencer KM, Nestor PG, *Niznikiewicz MA, Valdman O, **Shenton ME**, McCarley RW. Hyperpriming of attention shifting in schizophrenia: Experiment and simulation. *International J of Psychopharmacology* 2004;54:20-20.
- A222. McCarley RW, **Shenton ME**, *Onitsuka T, Nestor P, *Niznikiewicz MA, *Salisbury D. Fusiform gyrus volume reduction and altered face processing in schizophrenia. Poster presented at the *43rd Annual Meeting of the American College of Neuropsychopharmacology*, December, 2004, San Juan, Puerto Rico. *Neuropsychopharmacology* 2004;29:S64-S64.

- A223. **Shenton ME**, Gerig G, *Kwon JS, *Park HJ, *Deutsch C, *Kubicki M, McCarley RW. Midline cavum septi pellucidi abnormalities, shape abnormalities, and diffusion tensor corpus callosum asymmetry abnormalities in schizophrenia. *International J of Neuropsychopharmacology* 2004;7:S59-S59.
- A224. *Koo M, *Dickey CC, **Shenton ME**, *Ji NY, *Bouix S, *Kuroki N, Voglmaier MM, Seidman LJ, *Nakamura M, McCarley RW. Smaller neocortical gray matter and larger CSF volumes in female neuroleptic-naive subjects with personality disorder. *10th International Congress on Schizophrenia Research Meeting*, Savannah, Georgia, 2005, *Schizophr Bull* 2005;3(2):396-396.
- A225. *Kubicki M, Nestor PG, *Connor E, *Ungar L, *Niznikiewicz M, Kikinis R, McCarley RW, **Shenton ME**. Evidence of executive attentional network abnormalities in schizophrenia. *10th International Congress on Schizophrenia Research Meeting*, Savannah, Georgia, 2005, *Schizophr Bull* 2005;3(2):396-396.
- A226. *Levitt JJ, *Connor EE, *Woolston SL, *Ungar LP, *Kuroki N, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. The limbic striatum in schizophrenia: An MRI study. *10th International Congress on Schizophrenia Research Meeting*, Savannah, Georgia, 2005, *Schizophr Bull* 2005;3(2):397-397.
- A227. *Nakamura M, McCarley RW, *Kubicki M, *Dickey CC, *Niznikiewicz MA, Voglmaier MM, Seidman LJ, Maier SE, Westin CF, Kikinis R, **Shenton ME**. Fronto-temporal disconnectivity in schizotypal personality disorder: A diffusion tensor imaging study. *10th International Congress on Schizophrenia Research Meeting*, Savannah, Georgia, 2005, *Schizophr Bull* 2005;3(2):401-401.
- A228. *Dickey CC, *Kubicki M, Morocz I, **Shenton ME**, *Dreusicke M, *Connor E, Seidman LJ, Voglmaier M, *Niznikiewicz M, *Paynter V, McCarley RW. Early auditory sensory processing in schizotypal personality disorder: A fMRI study. *10th International Congress on Schizophrenia Research Meeting*, Savannah, Georgia, 2005, *Schizophr Bull* 2005;3(2):416-416.
- A229. McCarley RW, *Spencer KM, Nestor PG, Perlmutter R, *Niznikiewicz MA, Klump MC, *Frumin M, **Shenton ME**. Abnormal gamma band neural synchrony indexes disordered perception and cognition in schizophrenia. *10th International Congress on Schizophrenia Research Meeting*, Savannah, Georgia, 2005, *Schizophr Bull* 2005;3(2):459-459.
- A230. *Niznikiewicz MA, *Paynter V, *Lucia L, Nestor P, **Shenton M**, McCarley RW. Hyper-priming in first episode schizophrenia. *10th International Congress on Schizophrenia Research Meeting*, Savannah, Georgia, 2005, *Schizophr Bull* 2005;3(2):460-461.
- A231. *Salisbury DF, Collins KC, *Kuroki N, **Shenton ME**, McCarley RW. Auditory N1 and Heschl's gyrus in first hospitalized and chronic schizophrenia. *10th International Congress on Schizophrenia Research Meeting*, Savannah, Georgia, 2005, *Schizophr Bull* 2005;3(2):462-462.
- A232. *Allen CG, Nestor PG, *Niznikiewicz MA, Cunningham T, Adams J, **Shenton ME**, McCarley RW. Transdermal nicotine-effects on attention in schizophrenia. *10th International Congress on Schizophrenia Research Meeting*, Savannah, Georgia, 2005, *Schizophr Bull* 2005;3(2):509-509.
- A233. *Nakamura M, *Hirayasu H, *Salisbury DF, *Bouix S, Pohl KM, Yoshida T, *Koo MS, **Shenton ME**, McCarley RW. Smaller neocortical gray matter volume in both first episode schizophrenia and first episode affective psychosis, determined by a new segmentation algorithm. Poster presented at the 60th Annual Meeting of Biological Psychiatry, Atlanta, GA, *Biological Psychiatry* 2005:57:29S-29S.
- A234. McCarley RW, **Shenton ME**, *Kasai K, *Salisbury DF. Regionally specific progression of MRI gray matter volume loss after schizophrenia onset. Poster presented at the 60th Annual Meeting of Biological Psychiatry, Atlanta, GA, *Biological Psychiatry* 2005:57:72S-72S.
- A235. *Koo MS, *Dickey CC, **Shenton ME**, *Ji NY, *Bouix S, Voglmaier MM, *Levitt JJ, *Nakamura M, McCarley RW. Neocortical gray matter and CSF abnormalities in female neuroleptic-naive subjects with schizotypal

personality disorder determined with new segmentation method. Poster presented at the 60th Annual Meeting of Biological Psychiatry, Atlanta, GA, *Biological Psychiatry* 2005;57:98S-98S.

- A236. *Kubicki M, Nestor PG, *Connor EE, *Ungar LP, *Niznikiewicz MA, McCarley RW, **Shenton ME**. Evidence of executive attentional network abnormalities in schizophrenia. Poster presented at the 60th Annual Meeting of Biological Psychiatry, Atlanta, GA, *Biological Psychiatry* 2005;57:116S-116S.
- A237. *Salisbury DF, Collins KC, *Kuroki N, **Shenton ME**, McCarley RW. Auditory N1 deficits in chronic and in first-hospitalized schizophrenia. Poster presented at the 60th Annual Meeting of Biological Psychiatry, Atlanta, GA, *Biological Psychiatry* 2005;57:196S-196S.
- A238. *Levitt JJ, *Rosow LK, *Connor EE, *Ungar LP, *Kuroki N, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. The limbic striatum in schizophrenia: An MRI study. Poster presented at the 60th Annual Meeting of Biological Psychiatry, Atlanta, GA, *Biological Psychiatry* 2005;57:204S-204S.
- A239. **Shenton ME**, *Salisbury DF, *Kasai K, *Kubicki M, *Park HJ, McCarley RW. In vivo neuroimaging data in support of auditory processing abnormalities in schizophrenia. *Biological Psychiatry* 2005;57(8):18S-19S.
- A240. *Dreusicke M, *Dickey CC, Morocz I, *Niznikiewicz M, Voglmaier M, Seidman L, *Paynter V, **Shenton ME**, McCarley RW. fMRI Suggests Altered Emotional Language Processing in Schizotypal Personality Disorder (SPD). *Fourteenth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee*, Department of Psychiatry, April 5, 2006.
- A241. *Markant D, *Levitt JJ, *Cohen A, *Bouix S, McCarley RW, **Shenton ME**. Optimized Voxel-Based Morphometric Analysis of Gray Matter in Chronic Schizophrenia. *Fourteenth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee*, Department of Psychiatry, April 5, 2006.
- A242. *Bushell GB, *Kubicki M, *Bouix S, *Park HJ, *Dreusicke MH, Westin CF, Kikinis R, McCarley RW, **Shenton ME**. Diffusion Fiber Tractography Suggests Fronto-Temporal Disconnectivity in Schizophrenia. *Fourteenth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee*, Department of Psychiatry, April 5, 2006.
- A243. Gerrothanassis D, *Dickey CC, **Shenton ME**, *Niznikiewicz MA, Voglmaier M, *Cohen AS, *Bushell GL, *Dreusicke MH, Seidman LJ, McCarley RW. A Pilot Volumetric MRI Study of the Prefrontal Cortex in Individuals with Schizotypal Personality Disorder. *Fourteenth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee*, Department of Psychiatry, April 5, 2006.
- A244. Wolfe D, Morocz I, McCarley RW, Seidman L, Thermenos H, *Dreusicke M, *Paynter V, Voglmaier M, *Niznikiewicz M, **Shenton ME**, *Dickey CC. Altered Cortical Activity During Visual Working Memory in Schizotypal Personality Disorder: A Pilot fMRI Study. *Fourteenth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee*, Department of Psychiatry, April 5, 2006.
- A245. *Hsu LY, *Dickey CC, **Shenton ME**, *Niznikiewicz MA, Voglmaier M, Seidman L, *Paynter V, McCarley RW. Superior Temporal Sulcus Volumes and Schizotypal Personality Disorder Deficits. *Fourteenth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee*, Department of Psychiatry, April 5, 2006.
- A246. *Dickey CC, Morocz IA, *Dreusicke M, *Paynter V, Voglmaier M, *Niznikiewicz M, Seidman LJ, **Shenton ME**, McCarley RW. Lack of Cingulate activation by fMRI in subjects with schizotypal personality disorder during an emotional courting stroop task. *Biological Psychiatry* 2006;59(8s):28s-28s.
- A247. *Niznikiewicz M, *Spencer K, *Paynter V, Voglmaier M, *Dickey C, Seidman L, **Shenton M**, McCarley R. Abnormal pitch MMN in schizotypal personality disorder individuals. *Biological Psychiatry* 2006;59(8s):28s-28s.

- A248. Wolfe DJ, *Dickey CC, Seidman LJ, Morocz IA, Thermenos HW, *Dreusicke MH, *Paynter VR, Voglmaier MM, *Niznikiewicz MA, **Shenton ME**, McCarley RW. Altered cortical activity during visual working memory in schizotypal personality disorder: A pilot fMRI study. *Biological Psychiatry* 2006;59(8s):31s-31s.
- A249. Gerothanassis D, *Dickey CC, **Shenton ME**, *Niznikiewicz MA, Voglmaier MM, *Cohen AS, *Bushell GL, *Dreusicke MH, Seidman LJ, McCarley RW. A pilot volumetric MRI study of the prefrontal cortex in individuals with schizotypal personality disorder. *Biological Psychiatry* 2006;59(8s):35s.
- A250. *Salisbury DF, Adler M, Brown C, **Shenton ME**, McCarley RW. P300, cognition, and symptoms at first hospitalization and longitudinally in the first episode schizophrenia. *Biological Psychiatry* 2006;59(8s):54s-54s.
- A251. *Kubicki M, *Bushell GL, *Markant D, *Dreusicke M, *Park HJ, *Bouix S, Westin CF, Kikinis R, McCarley RW, **Shenton ME**. In-vivo diffusion fiber tractography suggests disruptions in connectivity between the frontal and temporal lobes in schizophrenia. *Biological Psychiatry* 2006;59(8s):57s-57s.
- A252. *Kubicki M, *Ungar L, Wible, CG, Nestor PG, *Connor EE, Westin CF, Kikinis R, **Shenton ME**, McCarley RW. Executive attentional network-functional activation and anatomical integrity in schizophrenia. *Biological Psychiatry* 2006;59(8s):83s-83s.
- A253. *Nakamura M, Nestor PG, **Shenton ME**, *Niznikiewicz MA, *Levitt JJ, *Kawashima T, *Cohen AS, McCarley RW. Orbitofrontal volume deficit and sulcal pattern alteration in schizophrenia and volumetric association with the Iowa gambling task. *Biological Psychiatry* 2006;59(8s):117s-117s.
- A254. *Levitt JJ, *Rosow LK, *Conner EE, *Ungar LP, *Kuroki N, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. An MRI study of ventral and dorsal striatum in schizophrenia. *Biological Psychiatry* 2006;59(8s):160s-160s.
- A255. *Koo MS, *Kubicki M, McCarley RW, *Niznikiewicz M, *Kuroki N, *Lee KU, *Levitt JJ, Westin CF, *Bouix S, **Shenton ME**. Diffusion tensor imaging study of the fornix and hippocampus in neuroleptic-naive schizotypal personality disorder. *Biological Psychiatry* 2006;59(8s):163s-163s.
- A256. **Shenton ME**, *Kubicki M, *Bouix S, *Niethammer M, O'Donnell L, Westin CF, Fletcher T, Styner M, Whitaker R, Gerig G, Kikinis R. Diffusion tensor Analysis. Poster presented at the Road Map National Centers for Biomedical Computing (NCBC), All Hands Meeting, Lister Hill Center and Natcher Conference Center, National Institute of Health, Bethesda, MD, July 17, 2006.
- A257. *Kubicki M, *Park HJ, Nestor PG, *Bushell G, Westin CF, *Niethammer M, *Markant D, Kindlmann G, *Rosenberger G, Kikinis R, McCarley RW, **Shenton ME**. Disruptions in connectivity between frontal and temporal lobes in schizophrenia: A diffusion fiber tractography study. *45th Annual Meeting of the American College of Neuropsychopharmacology*, December 5, 2006, Hollywood, FL. *International J of Neuropsychopharmacology* 2006;9:S42-S42.
- A258. McCarley RW, *Spencer KM, **Shenton ME**, Nestor PG. Abnormalities of gamma EEG oscillations in schizophrenia. *Neuropsychopharmacology* 2006;31:S64-S64.
- A259. *Dickey CC, Morocz IA, *Khan U, *Niznikiewicz M, Voglmaier M, Seidman LJ, **Shenton ME**, McCarley RW. Pilot fMRI study of prosody in schizotypal personality disorder: Sarcasm is difficult to process. *Neuropsychopharmacology* 2006;31:S85-S85.
- A260. *Kubicki M, *Park JH, Nestor PG, *Bushell G, Westin CF, *Niethammer M, *Markant D, Kindlmann G, *Rosenberger G, Kikinis R, McCarley RW, **Shenton ME**. Disruptions in connectivity between frontal and temporal lobes in schizophrenia: A diffusion fiber tractography study. *Neuropsychopharmacology* 2006;31:S154-S154.

- A261. Romero JR, Ramirez DM, Aglio LS, **Shenton ME**, Pascual-Leone A, Titone D, Richardson M, Gugino LD. Benefit of stereotactic optic guidance for reproducibility of motor cortex functional maps using transcranial magnetic stimulation (TMS). *Neurology* 2006;66(5):A179-A179.
- A262. *Nakamura M, *Hirayasu Y, *Salisbury DF, *Bouix S, Pohl KM, Yoshida T, *Koo MS, **Shenton ME**, McCarley RW. Neocortical gray matter volume in first episode schizophrenia and first episode affective disorder: A cross-sectional and longitudinal study. *Schizophr Res* 2006;81:5S-5S.
- A263. *Kubicki M, Nestor P, *Connor E, *Ungar L, *Niznikiewicz M, McCarley RW, **Shenton ME**. Relationship between color stroop performance and cingulum bundle diffusion anisotropy in schizophrenia. *Schizophr Res* 2006;81:160S-161S.
- A264. *Jeong BS, *Kubicki M, Wible C, **Shenton M**, McCarley RW. Conjoint abnormalities of fMRI activation and of white matter connectivity of left inferior PFC in schizophrenia. Poster presented at the 15th Annual Research Day, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 25, 2007.
- A265. *Rosenberger G, *Kubicki M, Nestor P, *Connor E, *Bushell G, *Markant D, Westin CF, Kikinis R, McCarley RW, **Shenton ME**. Age-related decline in frontal-temporal lobe connections in schizophrenic patients: a diffusion tensor tractography study. Poster presented at the 15th Annual Research Day, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 25, 2007.
- A266. *Smith K, *Kubicki M, O'Donnell L, Westin CF, *Niznikiewicz M, McCarley RW, **Shenton ME**. Automatic cluster analysis of corpus callosum subdivisions in schizophrenia: A diffusion tensor imaging study. Poster presented at the 15th Annual Research Day, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 25, 2007.
- A267. *Fitzsimmons J, *Kubicki M, *Smith K, San Jose R, Westin CF, Kikinis R, McCarley R, **Shenton M**. Diffusion tractography of the fornix in male schizophrenic patients. Poster presented at the 15th Annual Research Day, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 25, 2007.
- A268. *Davidson CA, *Levitt JJ, *Kuroki N, *Niznikiewicz M, McCarley RW, **Shenton ME**. An MRI study of septi pellucidi in relation to hippocampus and fornix in schizophrenia. Poster presented at the 15th Annual Research Day, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 25, 2007.
- A269. *Alvarado JL, *Levitt JJ, *Khan U, *Markant D, *Niznikiewicz M, McCarley RW, **Shenton ME**. Abnormalities in the anterior limb of the internal capsule in schizophrenia using diffusion tensor imaging. Poster presented at the 15th Annual Research Day, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 25, 2007.
- A270. *Nakamura M, *Khan U, *Kubicki M, *Bouix S, *Quintus K, Kindlmann G, Westin CF, Kikinis R, *Niznikiewicz M, McCarley RW, **Shenton ME**. White matter abnormalities in whole brain and its regional specificity in chronic schizophrenia: a diffusion tensor imaging study. Poster presented at the 15th Annual Research Day, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 25, 2007.
- A271. *Khan U, Morocz I, McCarley RW, **Shenton ME**, *Niznikiewicz M, *LaVallee S, Voglmaier M, *Dickey CC. Abnormal prosody processing in schizotypal personality disorder in fMRI experiments. Poster presented at the 15th Annual Research Day, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 25, 2007.
- A272. *Markant D, *Levitt JJ, *Cohen A, *Bouix S, *Niznikiewicz M, McCarley RW, **Shenton ME**. Inferior frontal gyrus volume reduction in chronic schizophrenia: An MRI study. Poster presented at the 15th Annual Research Day, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 25, 2007.

- A273. *LaVallee SE, Voglmaier MM, **Shenton ME**, *Dickey CC, Seidman LJ, McCarley RW, *Niznikiewicz MA. Category Formation in Schizotypal Adults: Event-Related Potential and Behavioral Correlates. Poster presented at the 15th Annual Research Day, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 25, 2007.
- A274. Minney DS, McCarley RW, **Shenton ME**, *Niznikiewicz M, Voglmaier M, Seidman LJ, *LaVallee S, *Khan UA, *Smith K, *Dickey CC. Neuroleptic-Naive Schizotypal Personality Disorder Subjects and Volumetric Measurements of the Superior Temporal Sulcus. Poster presented at the 15th Annual Research Day, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 25, 2007.
- A275. *Kubicki M, Styner M, *Markant D, *Dreusicke M, *Bouix S, Kikinis R, McCarley RW, **Shenton ME**. Interhemispheric connectivity and schizophrenia - Diffusion tensor imaging study. *International Congress of Schizophrenia Research 2007, Schizophr Bull* 2007;33(2):340-340.
- A276. *Levitt JJ, *Rosow LK, *Khan U, Kikinis R, Jolesz FA, McCarley RW, **Shenton ME**. The ventral and dorsal striatum in schizophrenia: An MRI study. *International Congress of Schizophrenia Research 2007, Schizophr Bull* 2007;33(2):342-342.
- A277. McCarley RW, *Nakamura M, Nestor PG, *Niznikiewicz MA, *Levitt JJ, *Kawashima T, *Hsu L, *Cohen A, **Shenton ME**. Region-specific orbitofrontal volume deficit in schizophrenia and orbitofrontal volumetric association with Iowa gambling task in healthy population. *International Congress of Schizophrenia Research 2007, Schizophr Bull* 2007;33(2):345-345.
- A278. *Nakamura M, Nestor PG, McCarley RW, *Niznikiewicz MA, *Levitt JJ, *Kawashima T, *Hsu L, *Cohen A, **Shenton ME**. Altered orbitofrontal sulco-gyrus pattern in schizophrenia. *International Congress of Schizophrenia Research 2007, Schizophr Bull* 2007;33(2):348-349.
- A279. *Dickey CC, Morocz IA, *Khan U, **Shenton ME**, *Niznikiewicz M, Voglmaier M, McCarley RW. Abnormal prosody processing and production in schizotypal personality disorder: A pilot fMRI and behavioral study. *International Congress of Schizophrenia Research 2007, Schizophr Bull* 2007;33(2):366-366.
- A280. *Kubicki M, *Rosenberger G, Westin CF, Nestor P, **Shenton M**. Abnormalities in white matter fronto-temporal connections in chronic schizophrenia. *International Congress of Schizophrenia Research 2007, Schizophr Bull* 2007;33(2):374-375.
- A281. **Shenton ME**. Longitudinal diffusion tensor imaging (DTI) of white matter changes in schizophrenia. *Schizophr Bull* 2007;33(2):355-355.
- A282. *Fitzsimmons J, *Kubicki M, *Smith K, San Jose R, Westin CF, Kikinis R, McCarley R, **Shenton M**. Diffusion tractography of the fornix in male schizophrenia patients. Poster presented at the *Society for Biological Psychiatry 2007 Annual Meeting*, San Diego, CA. *Biol Psychiatry* 2007;61:75S-76S.
- A283. *Kubicki M, Styner M, *Markant D, *Bouix S, Kikinis R, McCarley RW, **Shenton ME**. Corpus callosum and schizophrenic-diffusion tensor imaging study. Poster presented at the *Society for Biological Psychiatry 2007 Annual Meeting*, San Diego, CA. *Biol Psychiatry* 2007;61:159S-159S.
- A284. *Rosenberger G, *Kubicki M, Westin CF, *Markant D, *Bushell GB, Kikinis R, McCarley RW, **Shenton ME**. Age-related decline in fronto-temporal connections in schizophrenic patients: A diffusion tensor Tractography study. Poster presented at the *Society for Biological Psychiatry 2007 Annual Meeting*, San Diego, CA. *Biol Psychiatry* 2007;61:160S.-160.
- A285. *Jeong B-S, *Kubicki M, Wible C, **Shenton M**, McCarley RW. Conjoint abnormalities of fMRI activation and of white matter connectivity of left inferior PFC in schizophrenia. Poster presented at the *Society for Biological Psychiatry 2007 Annual Meeting*, San Diego, CA. *Biol Psychiatry* 2007;61:243-243SS.

- A286. *Levitt JJ, *Markant DM, McCarley RW, *Kawashima T, *Nakamura M, *Bouix S, *Kubicki M, **Shenton ME**. Inferior frontal gyrus and thalamic volume reduction in schizophrenia: An MRI study. Poster presented at *the Society for Biological Psychiatry 2007 Annual Meeting*, San Diego, CA. *Biol Psychiatry* 2007;61:245S-245S.
- A287. Synder JS, *Niznikiewicz MA, Nestor PG, **Shenton ME**, McCarley RW. Auditory recurrent and lateral suppression in schizophrenia. Poster presented at *the Society for Biological Psychiatry 2007 Annual Meeting*, San Diego, CA. *Biol Psychiatry* 2007;61:250S-250S.
- A288. *Nakamura M, Nestor PG, McCarley RW, *Niznikiewicz MA, *Levitt JJ, Kawashima T, Hsu L, *Cohen A, **Shenton ME**. Altered Orbitofrontal Sulcogyrall Pattern and Region-Specific Orbitofrontal Volume Deficit in Schizophrenia. Symposium Presentation at 12th Annual Meeting of Japanese Society of Cognitive Neuroscience, July 22, 2007, Fukuoka, Japan.
- A289. *Dickey C, Morocz I, **Shenton ME**, *Niznikiewicz M, Voglmaier V, Seidman L, *Kahn U, Zack R, McCarley RW. Prosody in schizotypal personality disorder: A behavioral and imaging study. Poster presented at *the 46th Meeting of the American College of Neuropsychopharmacology*, Boca Raton, FL, December 2007.
- A290. *Levitt JJ, *Markant DB, McCarley RW, Nestor PG, *Kawashima T, *Nakamura M, *Bouix S, *Kubicki M, **Shenton ME**. An optimizing VBM and manual tracing study of inferior frontal gyrus in schizophrenia. Poster presented at *the 46th Meeting of the American College of Neuropsychopharmacology*, Boca Raton, FL, December 2007.
- A291. **Shenton ME**, *Tgo T, *Rosenberger G, Westin C, *Levitt JJ, McCarley RW, *Kubicki M. Study of thalamocortical white matter fiber tract projects in schizophrenia using diffusion stochastic tractography. Poster presented at *the 46th Meeting of the American College of Neuropsychopharmacology*, Boca Raton, FL, December 2007.
- A292. *Levitt J, Styner M, Niethammer M, *Bouix S, *Koo MS, Voglmaier M, *Dickey C, *Niznikiewicz M, McCarley RW, **Shenton ME**. Caudate nucleus shape abnormalities in schizotypal personality disorder. Poster presented at *the Society for Biological Psychiatry 2008 Annual Meeting*, Washington, DC., 2008;63:55S-55S.
- A293. *Levitt J, *Alvarado J, *Kubicki M, Nestor PG, McCarley RW, **Shenton ME**. Decreased anisotropy in the anterior limb of the internal capsule in schizophrenia: A diffusion tensor imaging. Poster presented at *the Society for Biological Psychiatry 2008 Annual Meeting*, Washington, DC., 2008;63:258S-258S.
- A294. *Khan U, *Kubicki M, Westin CF, Pieper S, McCarley RW, **Shenton ME**. Atlas-based segmentation of DTI in schizophrenia. Poster presented at *the Society for Biological Psychiatry 2008 Annual Meeting*, Washington, DC., 2008;63:257S-257S.
- A295. *Kawashima T, *Niznikiewicz M, *Nakamura M, *Davidson C, *Salisbury D, **Shenton ME**, McCarley RW. Progressive decrease of right prefrontal cortex gray matter volume in first-episode schizophrenia: A longitudinal magnetic resonance imaging study. Poster presented at *the Society for Biological Psychiatry 2008 Annual Meeting*, Washington, DC., 2008;63:275S-275S.
- A296. *Voineskos AN, O'Donnell LJ, Lobaugh NJ, *Niethammer M, *Markant D, Mulsant BH, Pollock BG, Kennedy JL, Westin CF, **Shenton ME**. Quantitative examination of a novel clustering method using magnetic resonance diffusion tensor tractography. Poster presented at *the Society for Biological Psychiatry 2008 Annual Meeting*, Washington, DC., 2008;63:279S-279S.
- A297. *Oh JS, **Shenton ME**, Westin CF, *Kubicki M. Decreased resting-state functional connectivity in schizophrenia. Poster presented at *the Society for Biological Psychiatry 2008 Annual Meeting*, Washington, DC., 2008;63:55S-55S.
- A298. *Dickey CC, *Niznikiewicz M, Voglmaier M, **Shenton ME**, Seidman L, *Chakerian J, Zacks R, Murphy C, McCarley RW. Pars opercularis and verbal fluency in schizotypal personality disorder. Poster presented at *the Society for Biological Psychiatry 2008 Annual Meeting*, Washington, DC., 2008;63:141S-141S.

- A299. McCarley RW, *Nakamura M, **Shenton ME**, *Salisbury DF. Progression of MRI and electrophysiological abnormalities in first episode patients with schizophrenia & affective (Bipolar) psychosis. Poster presented at *the Society for Biological Psychiatry 2008 Annual Meeting*, Washington, DC., 2008;63:237S-238S.
- A300. Whitfield-Gabrieli S, Thermenos HW, Milanovic S, Tsuang MT, Faraone SV, McCarley RW, **Shenton ME**, Green AI, LaViolette P, Wojcik J, Gabrieli JDE, Seidman LF. Hyperactivity and hyperconnectivity of the default network in schizophrenia and in first degree relatives of persons with schizophrenia. Poster presented at *the Society for Biological Psychiatry 2008 Annual Meeting*, Washington, DC., 2008;63:272S-272S.
- A301. *Fitzsimmons J, *Smith K, *Kubicki M, San Jose R, Westin CF, Kikinis R, McCarley RW, *Salisbury D, **Shenton ME**. Fornix in first episode schizophrenia: A diffusion tractography study. Poster presented at the 16th *Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 30, 2008.
- A302. *Alvarado J, *Davidson CA, *Niethammer M, McCarley RW, *Kubicki MR, **Shenton ME**, *Levitt JJ. Sobel filter segmentation of the globus pallidus in schizophrenics. Poster presented at the 16th *Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 30, 2008.
- A303. *Khan U, *Kubicki M, Westin CF, Pieper P, McCarley RW, **Shenton ME**. Atlas based analysis of compromised white matter integrity in schizophrenia using diffusion tensor imaging. Poster presented at the 16th *Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 30, 2008.
- A304. *Torres L, *Niethammer M, *Alvarado JL, *Dickey CC, *Levitt JJ, *Hoogenboom WS, McCarley RW, **Shenton ME**. Hypothalamus volume and positive symptoms in schizophrenia spectrum disorders. Poster presented at the 16th *Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 30, 2008.
- A305. **Shenton ME**, *Kawashima T, *Fitzsimmons J, *Salisbury D, *Bouix S, Westin CF, McCarley RW, *Kubicki M. Advances in white matter imaging in schizophrenia. *The Journal of The European College of Neuropsychopharmacology*, 2008;18(Supplement 4):S176.
- A306. **Shenton ME**, *Kawashima T, *Nakamura M, *Bouix S, *Salisbury DF, Westin CF, McCarley RW, Kubicki M. Uncinate fasciculus and cingulum bundle findings in first episode schizophrenia and first episode bipolar disorder: A diffusion tensor imaging study. *European Psychiatry*, 2008;23:S43-S44 Suppl.2.
- A307. *Voineskos A, O'Donnell L, Lobaugh N, *Markant D, *Niethammer M, Mulsant B, Pollock B, Kennedy J, Westin C, **Shenton M**. Quantitative examination of a novel clustering method using magnetic resonance diffusion tensor tractography. *Clin Inv Med*, 2008;31(4):S24, 18682080.
- A308. *Voineskos A, Lobaugh N, *Bouix S, Kennedy J, Mulsant B, Pollack B, **Shenton M**. Changes in three major frontotemporal white matter tracts in healthy aging and schizophrenia across the adult lifespan: A diffusion tensor tractography study. Poster presented at the *47th Annual Meeting of the American College of Neuropsychopharmacology*, Scottsdale, Arizona, December 10, 2008.
- A309. *Whitford T, *Kubicki M, *King R, *Khan U, *Markant D, *Alvarado J, McCarley R, **Shenton M**. Corpus callosum abnormalities in patients with schizophrenia: A diffusion-tensor imaging study. Poster presented at the *47th Annual Meeting of the American College of Neuropsychopharmacology*, Scottsdale, Arizona, December 10, 2008.
- A310. *Nakamura M, *Salisbury DF, *Hirayasu Y, McCarley RW, **Shenton ME**. Disease Specific Alteration of Orbitofrontal Sulcogyrual Pattern in First Episode Schizophrenia. Oral Presentation at *1st Schizophrenia International Research Society Conference*, June 23, 2008, Venice, Italy.

- A311. *Nakamura M, Nestor PG, McCarley RW, *Niznikiewicz MA, *Levitt JJ, *Kawashima T, Hsu L, *Cohen A, **Shenton ME**. Oral Presentation, Altered Orbitofrontal Sulcogyrual Pattern and Region-Specific Orbitofrontal Volume Deficit in Schizophrenia. *3rd Annual Meeting of Japanese Society of Schizophrenia Research*, March 14, 2008, Tokyo, Japan.
- A312. *Nakamura M, *Salisbury DF, *Hirayasu Y, *Bouix S, Pohl KM, Yoshida T, *Koo MS, **Shenton ME**, McCarley RW. Neocortical Gray Matter Volume in First Episode Schizophrenia and First Episode Affective Psychosis: A Cross-sectional and Longitudinal MRI Study. Oral Presentation at *3rd Annual Meeting of Japanese Society of Schizophrenia Research*, March 14, 2008, Tokyo, Japan.
- A313. *Nakamura M, *Hirayasu Y, **Shenton ME**, McCarley RW. Orbitofrontal Structural Alterations and Social Disturbance in Schizophrenia. Symposium Presentation at *13th Pacific Rim College of Psychiatrists Scientific Meeting (PRCP)*, November 2, 2008, Tokyo, Japan.
- A314. *Terry D, *Rausch AC, *Alvarado JL, Melonakos ED, *Markant D, Westin CF, Kikinis R, *Von Siebenthal J, **Shenton ME**, *Kubicki M. White matter properties of emotion related connections in schizophrenia. Poster presented Poster presented at the *17th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 8, 2009.
- A315. *Alvarado JL, *Terry DP, *Markant D, *Ngo T, Kikinis R, Westin CF, McCarley RW, **Shenton ME**, *Kubicki M. Study of language-related white matter fiber tract projections in schizophrenia using diffusion stochastic tractography. Poster presented Poster presented at the *17th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 8, 2009.
- A316. *Hoogenboom WS, Perlis RH, Smoller JW, Zeng-Treitier Q, Gainer VS, Murphy SN, Churchill SE, Kohane I, **Shenton ME**, *Iosifescu DV. Limbic structures in chronic depression: A study using pre-existing clinical and MRI data. Poster presented Poster presented at the *17th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 8, 2009.
- A317. *Romo-Nava F, *Hoogenboom WS, *Pelavin P, *Alvarado JL, *Bobrow L, Macmaster FT, Keshavan M, McCarley RW, **Shenton ME**. Pituitary volume in schizophrenia spectrum disorders. Poster presented Poster presented at the *17th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 8, 2009.
- A318. *Pelavin P, *Rausch AC, *Alvarado JL, McCarley RW, **Shenton ME**, Levitt JJ. Volumetric abnormalities in the dorsal and ventral striatum in chronic schizophrenia using MRI. Poster presented Poster presented at the *17th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 8, 2009.
- A319. *Bobrow LH, *Kubicki M, **Shenton ME**, McCarley RW, *Niznikiewicz MA. Differential fMRI activation in a priming paradigm using two different word relatedness types in schizophrenia. Poster presented Poster presented at the *17th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 8, 2009.
- A320. *Srinivasan P, *Rathi Y, McCarley RW, **Shenton ME**, *Bouix S. Measuring neocortical gray matter volume in chronic schizophrenia; An automated MR study. Poster presented Poster presented at the *17th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 8, 2009.
- A321. *Lucia D, *Schneiderman J, *Alvarado J, *Kubicki M, **Shenton ME**. Diffusion tensor imaging of the uncinate fasciculus in first-episode schizophrenia. Poster presented Poster presented at the *17th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 8, 2009.

- A322. *Kikinis Z, Fallon J, *Niznikiewicz M, *Kubicki M, Nestor P, Wible C, *Davidson C, *Bobrow L, *Pelavin P, *Chiu M, Fischl B, McCarley RW, Kikinis R, **Shenton ME**. Changes in gray matter volumes in rostral middle frontal gyrus of schizophrenia subjects. Poster presentation at the *International Congress of Schizophrenia Research*, San Diego, March 28 to April 1, 2009.
- A323. *Dickey C, Panych L, **Shenton ME**, Morocz I, *Niznikiewicz M, *Voglmaier M, *Zacks R, Murphy C, *Terry D, McCarley RW. Prosody in schizophrenia spectrum disorders. Poster presentation at the *International Congress of Schizophrenia Research*, San Diego, March 28 to April 1, 2009.
- A324. *Whitford TJ, *Kubicki M, *King R, *Khan U, *Markant D, *Alvarado J, McCarley RW, **Shenton ME**. Abnormalities in tensor morphology in patients with schizophrenia: A DTI study of the corpus callosum. Poster presentation at the *International Congress of Schizophrenia Research*, San Diego, March 28 to April 1, 2009.
- A325. Malcolm JG, **Shenton ME**, *Rathi Y. *BMAP* 2009, oral poster presentation “Multi-fiber tractography using a recursive filter”. August, 2009 (<http://www.ibmisps-worldcongress.org>).
- A326. *Levitt JJ, *Lucia DM, *Bobrow LH, McCarley RW, **Shenton ME**. Anterior cingulate and paracingulate abnormalities in schizophrenia. Oral presentation, *Society for Neuroscience Meeting*, Chicago, IL, October 17-21, 2009.
- A327. *Romo-Nava F, Hoogenboom WS, *Pelavin PE, *Alvarado JL, *Bobrow LH, McCarley RW, Keshavan M, **Shenton ME**. Pituitary gland volume in schizophrenia spectrum disorders. Poser session, 1st place award, *XXI National Meeting of the Mexican Psychiatric Association*, Acapulco, Mexico, November 13-17th, 2009.
- A328. *Rathi Y, Malcolm JG, *Bouix S, Kindlmann G, Westin C-F, *Kubicki M, **Shenton ME**. Mixture model for estimating fiber ODF and multi-directional tractography. In: *International Society for Magnetic Resonance in Medicine Scientific Meeting*, 2009.
- A329. Atwood SB, *Schneiderman JS, Lucia DM, Pelavin PE, Mesholam-Gately RI, Seidman LJ, *Goldstein JM, McCarley RW, *Kubicki M, **Shenton ME**. The uncinate fasciculus in first-episode schizophrenia. Poster presented at the *18th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.
- A330. *Ballinger T, *Kikinis Z, *Asami T, Finn CT, Kucherlapati R, *Kubicki M, **Shenton ME**. Axonal integrity of brain white matter tracts in 22q11del syndrome subjects: A diffusion tensor imaging study. Poster presented at the 18th Harvard Psychiatry Annual Research Day, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.
- A331. *Bobrow LH, *Kubicki M, *Markant D, *Bienfang DC, *Gitlin D, **Shenton ME**, Barsky AJ. Functional brain activity in patients with conversion disorder. Poster presented at the *18th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.
- A332. *Bolden KA, *Schneiderman JS, *LaVenture A, *Vu MT, *Pelavin PE, *Terry DP, Mesholam-Gately RI, Seidman LJ, *Goldstein JM, McCarley RW, Lyons MJ, *Kubicki M, **Shenton ME**. White matter differences in the Inferior longitudinal fasciculus between first episode and chronic schizophrenia patients. Poster presented at the 18th Harvard Psychiatry Annual Research Day, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.
- A333. *Hawley KJ, *Schneiderman JS, *Whitford TJ, *Pelavin PE, *Rausch AC, Mesholam-Gately RI, Seidman LJ, *Goldstein JM, McCarley RW, *Kubicki M, **Shenton ME**. Diffusion tensor imaging of the corpus callosum in patients with first-episode and chronic schizophrenia. Poster presented at the *18th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.

- A334. *Kikinis Z, *Asami T, *Ballinger T, Finn CT, Kucherlapati R, *Kubicki M, **Shenton ME**. DTI study of white matter integrity in 22q11del syndrome subjects. Poster presented at the *18th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.
- A335. *LaVenture AB, *Lee SH, *Asami T, *Pelavin PE, Seidman L, *Goldstein J, McCarley RW, **Shenton ME**, *Kubicki M. Abnormalities in white matter integrity in first-episode schizophrenia using atlas-based segmentation. Poster presented at the *18th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.
- A336. *Lee SH, *Asami T, *Kubicki M, *Pelavin P, Seidman L, *Goldstein J, Mesholam-Gately R, McCarley RW, **Shenton ME**. Correlation between executive function and white *matter* abnormalities in first-episode schizophrenia. Poster presented at the *18th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.
- A337. *Lucia D, *Bobrow L, *Kikinis Z, *Ballinger T, *Alvarado J, Finn C, Kucherlapati R, **Shenton ME**, *Kubicki M. Fractional anisotropy reductions of deep white matter in velocardiofacial (22q11del) syndrome subjects. Poster presented at the *18th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.
- A338. *Ng HP, *Kubicki M, *Pelavin P, *Rathi Y, *Malcolm J, *Lucia D, *Niznikiewicz M, Kikinis R, McCarley RW, **Shenton ME**. Inter-hemispheric fiber tracts between bilateral superior temporal gyrus gray matter and its asymmetry measures in chronic schizophrenia. Poster presented at the *18th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.
- A339. *Ohtani T, *Levitt JJ, Nestor P, *Niznikiewicz M, *Kawashima T, *Asami T, *LaVenture A, *Pelavin P, *Hawley K, *Ballinger T, *Alvarado J, *Terry D, ***Shenton ME**, McCarley RW. Prefrontal cortex volume deficit in schizophrenia. Poster presented at the *18th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.
- A340. *Pelavin PE, *Alvarado JL, Koerte I, *Saito Y, *Schneiderman J, *Niznikiewicz MA, McCarley, RW, *Kubicki M, **Shenton ME**. Motor deficits originating in the extrapyramidal system in chronic *schizophrenia*: A diffusion tensor imaging study. Poster presented at the *18th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.
- A341. *Rausch AC, *Whitford TJ, *Savadjiev, P, *Kubicki M, O'Donnell L, *Terry DP, *Bouix S, Westin C-F, *Schneiderman JS, *Bobrow L, *Niznikiewicz M, Nestor PG, Pantelis C, Wood S, *McCarley RW, **Shenton ME**. Fiber geometry and its relationship to fractional anisotropy in the genu of patients with schizophrenia. Poster presented at the *18th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.
- A342. *Schneiderman JS, *Whitford TJ, *Pelavin PE, *Terry DP, *Swisher, T, Mesholam-Gately RI, Seidman LJ, *Goldstein JM, McCarley RW, *Kubicki M, **Shenton ME**. The cingulum bundle in first episode schizophrenia. Poster presented at the *18th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.
- A343. *Terry DP, *Rausch AC, *Whitford TJ, Nestor PG, O'Donnell L, *Bobrow LH, Westin CF, Kikinis R, McCarley RW, **Shenton ME**, *Kubicki M. Neuropsychology measures predict integrity of functional white matter networks in chronic schizophrenia. Poster presented at the *18th Harvard Psychiatry Annual research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.
- A344. *Vu MT, *Zacks RB, Henry AM, McCarley RW, Panych LP, Voglmaier M, *Niznikiewicz MA, *Terry DP, **Shenton ME**, Dickey CC. Pars opercularis volumes, verbal fluency, and prosody deficits in schizotypal personality disorder: A common origin?. Poster presented at the *18th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.

- A345. *Whitford TJ, *Kubicki M, *Schneiderman JS, Hawley KJ, *Niznikiewicz M, McCarley RW, **Shenton ME**, *Spencer KM. Inter-Hemispheric Transfer Time and White Matter Integrity in Schizophrenia: a combined ERP and DTI study. Poster presented at the 18th Harvard Psychiatry Annual Research Day, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 24, 2010.
- A346. *Ng HP, *Kubicki, *Rathi Y, Malcolm J, *Pelavin P, Kikinis R, **Shenton ME**. Decreased fractional anisotropy in inter-hemispheric connection between bilateral superior temporal gyrus gray matter in chronic schizophrenia, Poster Presented at the *Schizophrenia International Research Society Conference*, Florence, Italy, 2010.
- A347. *Ng HP, *Kubicki M, *Rathi Y, *Pelavin P, Malcolm J, *Niznikiewicz M, McCarley RW, Kikinis R, **Shenton ME**. Abnormalities in inter-hemispheric white matter connection between the auditory cortex and its clinical correlates in chronic schizophrenia. *Decade of the Mind VI, Singapore*, October, 2010.
- A348. *Ng HP, *Kubicki M, Malcolm J, *Rathi Y, *Pelavin P, McCarley RW, **Shenton ME**. Diffusion two-tensor tractography study on inter-hemispheric connection between bilateral Heschl gyrus in schizophrenia", *18th Annual Meeting of International Society for Magnetic Resonance in Medicine*, Stockholm, Sweden, May, 2010.
- A349. *Ng HP, *Kubicki M, *Terry D, *Pelavin A, *Rausch A, **Shenton ME**. Connection between bilateral superior temporal gyrus in schizophrenia: a preliminary diffusion tensor imaging study", *18th Annual Meeting of International Society for Magnetic Resonance in Medicine*, Stockholm, Sweden, May, 2010.
- A350. *Ng HP, *Kubicki M, *Pelavin P, Rathi Y, Malcolm J, Lucia D, *Niznikiewicz M, Kikinis R, McCarley RW, **Shenton ME**. Inter-hemispheric fiber tracts between bilateral superior temporal gyrus gray matter and its asymmetry measures in chronic schizophrenia, *18th Harvard Psychiatry Annual Research Day*, Massachusetts, USA, March, 2010.
- A351. *Schneiderman JS, *Whitford TJ, *Pelavin PE, *Terry DP, *Swisher T, Mesholam-Gately RI, Seidman LJ, *Goldstein JM, McCarley RW, *Kubicki M, **Shenton ME**. Diffusion tensor imaging of the cingulum bundle in first episode schizophrenia. Poster presented at the *Schizophrenia International Research Society*, Venice, Italy, April 10-14, 2010. [*Schizophr Res*, 2010;117(2-3):461.]
- A352. *Schneiderman JS, *Whitford TJ, *Pelavin PE, *Lucia DM, Atwood SB, Mesholam-Gately RI, Seidman LJ, *Goldstein JM, McCarley RW, *Kubicki M, **Shenton ME**. Diffusion tensor imaging of the uncinate fasciculus in first episode schizophrenia. Poster presented at the *65th Annual Meeting of the Society of Biological Psychiatry*, New Orleans, LA, May 20-22, 2010. [*Biol Psychiatry*, 2010;67(9S):275.]
- A353. *Whitford TJ, *Kubicki M, *Schneiderman JS, McCarley RW, **Shenton ME**, *Spencer KM. Inter-hemispheric transfer time and white matter integrity in schizophrenia: A combined ERP and DTI study. Poster presented at the *65th Annual Meeting of the Society of Biological Psychiatry*, New Orleans, LA, May 20-22, 2010. [*Biol Psychiatry*, 2010;67(9S):279.]
- A354. *Iosifescu D, *Hoogenboom WS, Perlis RH, Smoller JW, Zeng-Treitler Q, Gainer VS, Murphy SN, Churchill SE, Kohane E, **Shenton ME**. Limbic system white matter microstructure and treatment outcomes in major depressive: A large scale DTI stud using legacy data. Poster presented at the *ACNP 49th Annual Meeting*, December 6, 2010, Miami, FL, p. 139-140 (*Neuropsychopharmacology* 2010;35:139-140S).
- A355. *Niznikiewicz M, Pinheiro A, Del Re E, Taosheng L, Nestor P, Thompson E, **Shenton M**, McCarley R. Abnormalities in social cognition related to gaze processing abnormalities in schizophrenia for conditions with higher processing demands. Poster presented at the *ACNP 49th Annual Meeting*, December 6, 2010, Miami, FL, p. 231. (*Neuropsychopharmacology* 2010;35:231S).
- A356. Thermenos H, Gabrieli S, Juelich R, Jabbar G, Salwen K, **Shenton M**, *Kubicki M, Kuperberg G, Gabrieli J, Seidman L, Keshavan M, DeLisi L. Altered language network activity in first-degree relatives of persons with

schizophrenia. Poster presented at the *ACNP 49th Annual Meeting*, December 6, 2010, Miami, FL, p. 245. (*Neuropsychopharmacology* 2010;35:245S).

- A357. *Schneiderman J, *Whitford T, *Pelavin P, *Lucia D, Atwood S, Mesholam-Gately R, Seidman L, *Goldstein J, McCarley R, *Kubicki M, **Shenton ME**. Poster presented at the *ACNP 49th Annual Meeting*, December 7, 2010, Miami, FL, p. 283. (*Neuropsychopharmacology* 2010;35:283S).
- A358. *Savadjiev P, *Kubicki M, *Bouix S, Kindlmann GL, **Shenton ME**, Westin C-F. Tract-based parameterization of local white matter geometry. In: *International Society for Magnetic Resonance in Medicine Conference* (Stockholm, Sweden), May, 2010.
- A359. *Savadjiev P, Westin C-F, *Rausch AC, Maddah M, *Bouix S, **Shenton ME**, *Kubicki M. Tract-oriented parameterization of left uncinate geometry abnormalities in schizophrenia. In: *Human Brain Mapping* (Barcelona, Spain), June, 2010.
- A360. *Rathi Y, Malcolm JG, *Bouix S, Westin C-F, **Shenton ME**. False positive detection using filtered tractography. In: *International Society for Magnetic Resonance in Medicine Scientific Meeting*, 2010.
- A361. *Koerte I, *Pelavin P, Kirmess B, Berweck S, Reiser M, *Kubicki M, **Shenton ME**, Heinen F, Ertl-Wagner B. Anisotropy of callosal motor fibers predicts impairment in children with periventricular leukomalacia. *ASNR* May, 2010, Boston, MA (Oral Presentation).
- A362. *Koerte I, Kaufmann D, *Pelavin P, *Eckbo R, *Rathi Y, Reiser M, *Kubicki M, Heinen F, **Shenton ME**, Ertl-Wagner B. Differentiation of transcallosal motor fibers of the upper and lower extremities in professional soccer players as demonstrated by a two-tensor algorithm. *RSNA*, December, 2011, Chicago, IL (Oral Presentation).
- A363. *Kikinis Z, *Asami T, *Ballinger T, *Bouix S, Finn CT, Tworog-Dube E, Jucherlapati R, Kikinis R, *Kubicki M, **Shenton ME**. White matter in 22q11 deletion syndrome subject: A tract-based spatial-statistics study. Poster presentation at the *International Imaging Genetics Conference*, Irvine, CA, January 17-18, 2011.
- A364. *Hsu PC, *Rathi, Y, *Eckbo R, Nestor P, *Niznikiewicz M, Thompson E, *Kubicki M, **Shenton ME**. Two-Tensor Diffusion Tensor Imaging of Acoustic Radiations in Schizophrenia. *Nineteenth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry*, Boston, MA, March 30, 2011.
- A365. *King R, *Asami T, *Pelavin P, *Ballinger T, *Hawley K, R, **Shenton ME**, *Kubicki M. Structural Abnormalities of the Extreme Capsule in Schizophrenia. *Nineteenth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry*, Boston, MA, March 30, 2011.
- A366. *Hamoda H, *Schneiderman J, Makris N, Seidman L, *Hawley K, *Ballinger T, McCarley R, *Goldstein J, **Shenton ME**. Abnormalities of Cerebellar-Thalamic Connections in Patients with First-Episode and Chronic Schizophrenia: A DTI Study. *Nineteenth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry*, Boston, MA, March 30, 2011.
- A367. *Hawley KJ, *Pelavin PE, Jabbar GA, Thermenos HW, Seidman LJ, Keshavan M, Delisi LE, **Shenton ME**, *Kubicki M. Diffusion Tensor Imaging of White Matter Tracts in Subjects at High Genetic Risk for the Development of Schizophrenia. *Nineteenth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry*, Boston, MA, March 30, 2011.
- A368. *Pelavin PE, *Ballinger TW, Zafonte R, **Shenton ME**, *Bouix S. Construction of a Normative White Matter Atlas as a Diagnostic Tool for Diffuse Axonal Injury in TBI. *Nineteenth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry*, Boston, MA, March 30, 2011.

- A369. *Swisher TM, *Kikinis Z, *Saito Y., *Hawley K.J, *Ballinger T.W, O'Donnell L, Finn CT, Tworog-Dube E, Kucherlapati R, Kikinis R, *Kubicki M, **Shenton ME**. Abnormalities of the Corpus Callosum in Patients with 22q11 Deletion Syndrome: A Study Using Whole-brain Tractography and Automated Fiber Clustering. *Nineteenth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry*, Boston, MA, March 30, 2011.
- A370. *Ballinger T, *Whitford TJ, *Bobrow L, *Vu M, Malcolm J, *Kubicki M, **Shenton ME**. Neural Effects of Spatial and Temporal Control/Non-control in a Navigation Task. *Nineteenth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry*, Boston, MA, March 30, 2011.
- A371. *Vu MT, Wolfe DJ, McCarley RW, *Niznikiewicz MA, *Voglmaier MM, **Shenton ME**, *Dickey CC. Default Mode Network Abnormalities in Schizotypal Personality Disorder. *Nineteenth Annual Research Day, Harvard Medical School. Sponsored by the Mysell Committee, Consolidated Department of Psychiatry*, Boston, MA, March 30, 2011.
- A372. Thermenos HW, Seidman LJ, Whitfield-Gabrieli S, Juelich R, Jabbar G, Salwen KK, **Shenton ME**, *Kubicki M, Kuperberg G, Gabrieli JD, Keshavan M, DeLisi L. Altered Language Network Activity and Verbal Memory Deficits in Young Adult First-Degree Relatives of Persons with Schizophrenia. Poster presented at the 13th Annual Meeting of the International Congress on Schizophrenia Research, Colorado Springs, CO, USA, April 2-6, 2011. [*Schizophr Bull*, 2011;37(suppl 1):153.]
- A373. *Schneiderman J, *Whitford T, *Pelavin P, *Terry D, *Swisher T, Mesholam-Gately R, Seidman LJ, *Goldstein J, McCarley R, *Kubicki M, **Shenton ME**. Cingulum Bundle Diffusion and Delusions of Reference in First Episode Schizophrenia. Poster presented at the 13th Annual Meeting of the International Congress on Schizophrenia Research, Colorado Springs, CO, USA, April 2-6, 2011. [*Schizophr Bulletin*, 2011;37(suppl 1):17.]
- A374. **Shenton ME**, *Schneiderman J, *Pelavin P, *Kubicki M. "Changes in White Matter in the Early Stages of Schizophrenia." Talk given as part of a symposium presentation on "Vulnerability to Progression in Schizophrenia," presented at the 13th Annual Meeting of the International Congress on Schizophrenia Research, Colorado Springs, CO, USA, April 2-6, 2011. [*Schizophr Bulletin*, 2011;37(suppl 1):176.]
- A375. *Voineskos A, Felsky D, Tiwari A, Lobaugh N, Mulsant B, **Shenton ME**, Kovacevic N, McIntosh AR, Kennedy JL. Genetic Mechanisms of Disrupted White Matter Connectivity in Schizophrenia. Poster presented at the 13th Annual Meeting of the International Congress on Schizophrenia Research, Colorado Springs, CO, USA, April 2-6, 2011. [*Schizophr Bulletin*, 2011;37(suppl 1):181.]
- A376. Dickey C, Panych L, *Zacks R, Voglmaier M, *Niznikiewicz M, Vu M, **Shenton ME**, McCarley R. Odd Speech of Schizotypal Personality Disorder Quantified on Single Word Level. Oral presentation at the 13th Annual Meeting of the International Congress on Schizophrenia Research, Colorado Springs, CO, USA, April 2-6, 2011. [*Schizophr Bulletin*, 2011;37(suppl 1):204.]
- A377. *Bouix S, *Pelavin P, *Pasternak, *Schneiderman J, *Kubicki M, Zafonte RD, **Shenton ME**. Diagnosis of Diffuse Axonal Injury with Diffusion Tensor Imaging, 3rd Federal Interagency Conference on TBI, Washington DC, 2011.
- A378. *Pasternak O, *Kubicki O, *Pelavin P, Zafonte RD, **Shenton ME**, and *Bouix S. Identification of Neuroinflammation in Mild Traumatic Brain Injuries using a Free-Water Atlas. *Annual Meeting of the Organization for the Human Brain Mapping*, 2011.
- A379. *Pasternak O, Westin C-F, *Bouix S, **Shenton ME**, *Kubicki M. Free Water Modulation of White Matter Integrity Measures - with Application to Schizophrenia. *International Society For Magnetic Resonance in Medicine Scientific Meeting*, 2011.

- A380. *Pasternak O, *Bouix S, *Kubicki M, *Pelavin P, *Schneiderman J, Zafonte RD, **Shenton ME**. Diffusion Imaging Reveals Two Spatially Separable Mechanisms In Mild TBI. *3rd Federal Interagency Conference on TBI*, Washington, DC, 2011.
- A381. *Wassermann D, *Savadjiev P, *Rathi Y, *Bouix S, *Kubicki M, Kikinis R, **Shenton ME**, Westin C-F. Cluster-Based Statistics Along White Matter Tracts. *International Society For Magnetic Resonance in Medicine Scientific Meeting*, 2011.
- A382. *Quan M, *Asami T, *Bouix S, *Kubicki M, *Whitford T, Mesholam-Gately R, *Goldstein J, Seidman L, **Shenton ME**, McCarley R. Smaller superior temporal gyrus MRI volume in first episode schizophrenia and its symptom correlations. Society for Neuroscience (SfN), Washington DC, USA, (Poster), November 12-16, 2011.
- A383. *Quan M, *Lee S-H, *Otsuka T, *Kikinis Z, *Kubicki M, *Rathi Y, Mesholam-Gately R, *Goldstein J, Seidman L, McCarley R, *Levitt J, **Shenton M**. Abnormalities of White Matter Tracts between Rostral Middle Frontal Gyrus / Inferior Frontal Gyrus and Striatum in First-Episode Schizophrenia. 66th Annual Meeting, Society of Biological Psychiatry (SOBP), San Francisco, USA, (Poster), May 12-14, 2011.
- A384. **Shenton ME**, *Pasternak O, *Bouix S, *Pelavin P, *Kubicki M, Zafonte R. Identification of Neuroinflammation in Mild Traumatic Brain Injury Using a Free Water Atlas, *9th World Congress on Brain Injury (IBIA)*, Edinburgh, Scotland, March 22, 2012.
- A385. *Kikinis Z, *Vu M, Makris N, *Bouix S, *Kubicki M, **Shenton ME**. Reduced Myelination of Anterior Commissure in Schizophrenia Subjects: a Diffusion Tensor Imaging Study. Poster presented at the *20th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 28, 2012.
- A386. *King R, *Hamoda H, Makris N, Mesholam-Gately R, McCarley R, Seidman L, **Shenton M**. Cerebellar-Thalamic White Matter Abnormalities in Prodromal Patients. Poster presented at the *20th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 28, 2012.
- A387. *McCaffrey D, *Ballinger T, Guttmann C, Assaf Y, **Shenton M**, *Kubicki M, *Pasternak O. Inflammation and Degeneration Dynamics in Multiple Sclerosis. Poster presented at the *20th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 28, 2012.
- A388. *Smith KA, Seidman L, Makris N, Faraone SV, Tsuang MT, **Shenton ME**, *Levitt J. Striatum Volume in Adolescents-at-Familial-Risk for Schizophrenia. Poster presented at the *20th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 28, 2012.
- A389. *Swisher TM, Michalowski AZ, *Kubicki M, **Shenton ME**, Waldinger RJ. White Matter Integrity of the Cingulum Bundle in Healthy Aging. Poster presented at the *20th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 28, 2012.
- A380. *Vu MT, *Kikinis Z, Peled S, Kulkarni P, Ferris C, Makris N, *Bouix S, Makinodan M, Kikinis R, *Kubicki M, Corfas G, **Shenton ME**. Changes in Myelination of the Anterior Commissure in Mice with Loss of ErbB Receptor Signaling in Oligodendrocytes. Poster presented at the *20th Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 28, 2012.
- A381. Francis AN, Seidman LJ, Jabber GA, Thermenos HW, Juelich R, Proal A, **Shenton M**, Kubicki M, Keshavan M, DeLisi LE. Neuroanatomical alterations in regions mediating language in young adults at high risk for inheritance of schizophrenia (FHR). Poster presented at *Schizophrenia International Research Society (SIRS) – Biennial Meeting*, Florence, Italy, April, 2012.

- A382. *Vu MT, *Kikinis Z, Peled S, Kulkarni P, Ferris C, *Bouix S, Makinodan M, *Kubicki M, Corfas G, **Shenton ME**. Changes in Myelination of Anterior Commissure in Mice with Loss of ErbB Receptor Signaling in Oligodendrocytes. Poster to be presented at the *Society of Biological Psychiatry* Annual Meeting, Philadelphia, PA, 2012.
- A383. *Vu MT, *Kikinis Z, Peled S, Kulkarni P, Ferris C, Makris N, *Bouix S, Makinodan M, Kikinis R, *Kubicki M, Corfas G, **Shenton ME**. Changes in Myelination of Anterior Commissure in Mice with Loss of ErbB Receptor Signaling in Oligodendrocytes. Poster to be presented at the 20th Harvard Psychiatry Annual research Day, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, March 28, 2012.
- A384. *Quan M, Tang Y, *Kubicki M, *Eckbo R, Zhang F, Gao Y, McCarley R, *Levitt J, Wang J, **Shenton ME**. VLPFC-Striatum Pathway in First-Episode Schizophrenia: A Cross-Sectional and Longitudinal DTI Study. 18th Annual Meeting, Organization for Human Brain Mapping (OHBM), Beijing, China, (Poster), June 10-14, 2012.
- A385. *Quan M, *Kubicki M, *Eckbo R, *Kikinis Z, McCarley RW, *Levitt JJ, **Shenton ME**. Changes in DLPFC-Striatum Connections in First Episode Schizophrenia: A Cross-Sectional and Longitudinal DTI Study. 3rd Biennial Schizophrenia International Research Society (SIRS), Florence, Italy, (Poster), April 14-18, 2012.
- A386. *Quan M, *Kubicki M, *Eckbo R, *Kikinis Z, McCarley RW, *Levitt JJ, **Shenton ME**. Changes in DLPFC-Striatum Connections in First Episode Schizophrenia: A Cross-Sectional and Longitudinal DTI Study. 3rd Biennial Schizophrenia International Research Society (SIRS), Florence, Italy, (Poster), April 14-18, 2012.
- A387. *Quan M, *Tang Y, *Kubicki M, *Eckbo R, Zhang F, Gao Y, McCarley RW, *Levitt JJ, Wang J, **Shenton M**. VLPFC-Striatum Pathway in First-Episode Schizophrenia: A Cross-Sectional and Longitudinal DTI Study. 18th Annual Meeting, *Organization for Human Brain Mapping (OHBM)*, Beijing, China, (Poster), June 10-14, 2012.
- A388. *Hamoda H, *Schneiderman J, Makris N, Seidman L, *Hawley K, *Ballinger T, McCarley R, **Shenton M**. A DTI study of cerebellar-thalamic connections in patients with first episode and chronic schizophrenia. Poster presentation at the 59th meeting of the *American Academy of Child & Adolescent Psychiatry*, San Francisco, CA, (Poster) October 25, 2012.
- A389. *Pasternak O, *Rathi Y, **Shenton M**, Westin C-F. Estimation of the angle between crossing fibers as a novel structural quantity. Proceedings of the 20th International Society for Magnetic Resonance in Medicine meeting (ISMRM), Melbourne, Australia, 2012.
- A390. Woodberry KA, Serur RA, Hallinan SB, Mesholam-Gately RI, Wojcik JD, Cousins A, Gnong-Granato AG, Friedman-Yakoobian M, Rodenhisler-Hill J, Hornbach S, Francis G, Min G, Tucker L, Keshavan M, *Goldstein J, **Shenton M**, McCarley RW, Seidman LJ. *Childhood onset of symptoms as reported in first episode schizophrenia and clinical high risk youth*. Poster presented at the Eighth International Conference on Early Psychosis, San Francisco, CA, 2012.
- A391. *Rathi Y, Michailovich O, *Bouix S, **Shenton ME**, Westin C-F. Predicting T1 information from diffusion data. Proceedings of the 20th International Society for Magnetic Resonance in Medicine Scientific Meeting (ISMRM), Melbourne, Australia, 2012.
- A392. Kaufmann D, *Koerte IK, Muehlmann M, Hartl E, Reiser M, Makris N, *Rathi Y, **Shenton ME**, Ertl-Wagner B. White matter integrity of motor tracts in professional musicians and soccer players. Poster session. *European Society of Radiology (ESR)*, Vienna, Austria, 2013.
- A393. *Pasternak O, *Bouix S, *Rathi Y, Branch C, Westin C-F, **Shenton M**, Lipton M. Identification of mild traumatic brain injuries by comparison of free-water corrected z-distributions. *Proceeding of the 21st International Society for Magnetic Resonance in Medicine Meeting (ISMRM)*, Salt Lake City, UT (accepted; 2013).

- A394. *Dahlben BA, *Rathi Y, Riklin-Raviv T, *Eckbo R, Simpson JC, McCarley RW, **Shenton ME**, *Levitt JJ. Aberrant wiring in fronto-striatal pathways in chronic schizophrenia. Poster presented at the 21st*Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 10, 2013.
- A395. *Fitzsimmons J, *Hamoda H, *Swisher T, *Terry D, *Rosenberger G, Seidman LJ, *Goldstein J, Mesholam-Gately R, Petryshen T, Wojcik J, Kikinis R, McCarley RW, **Shenton ME**, *Kubicki M. Diffusion tensor imaging study of the fornix in first episode schizophrenia and in healthy controls. Poster presented at the 21st*Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 10, 2013.
- A396. *Giwerc M, *Green K, *Kikinis Z, Porter C, Peled S, Kulkarni P, Ferris C, Kikinis R, Makris N, *Bouix S, **Shenton ME**, Kristal B. Tractography of fornix, cingulum, and corpus callosum in the rat brain. Poster presented at the 21st*Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 10, 2013.
- A397. *Green K, *Giwerc M, *Kikinis Z, *Bouix S, Makris N, Thompson E, Mezin J, Scheiber N, Corfas G, Kucherlapati R, Kikinis R, *Kubicki M, **Shenton ME**. Associations of ErbB4 SNP rs4673628 with integrity of the inferior longitudinal fasciculus and visual and verbal memory in chronic schizophrenia patients. Poster presented at the 21st*Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 10, 2013.
- A398. *Hosokawa T, *Niznikiewicz M, **Shenton ME**, *Salisbury D, Hirano Y, Oribe N, McCarley RW. Longitudinal study of parietal gray matter volume in first-episode schizophrenia. Poster presented at the 21st*Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 10, 2013.
- A399. *Mayinger M, *Koerte IK, *Muehlmann M, *Kaufmann D, *Purohit MP, Steffinger D, *Eckbo R, *Rathi Y, *Bouix S, *Pasternak O, Reiser M, Zafonte R, Stern RA, Ertl-Wagner B, *Kubicki M, **Shenton ME**. White matter integrity in professional soccer players without symptomatic concussion Poster presented at the 21st*Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 10, 2013.
- A400. *Pasternak O, Westin CF, *Bouix S, Seidman LJ, *Goldstein JM, Woo TW, Petryshen TL, Mesholam-Gately RI, McCarley RW, Kikinis R, **Shenton ME**, *Kubicki M. Global white matter inflammation pattern in first-episode schizophrenia – A free-water MRI study. Poster presented at the 21st*Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 10, 2013.
- A401. *Zuo JX, *Green G, Seidman LJ, *Goldstein JM, Petryshen TL, Mesholam-Gately RI, Wojcik J, McCarley RW, *Kubicki M, **Shenton ME**. Clinical and neuropsychological correlates of diffusion tensor imaging indices in first-episode schizophrenia. Poster presented at the 21st*Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, April 10, 2013.
- A402. *Fredman E, *Dahlben B, *Duskin J, *Kikinis Z, *Cho I-K, *Eckbo S, *Bouix S, Makris N, Coman I, Kates K, *Kubicki M, **Shenton M**. Delineation of the inferior longitudinal fasciculus in subjects with 22q11.2 deletion syndrome. Poster presented at the *International Congress of Schizophrenia Research*, Orlando, Florida, 2013.
- A403. *Kubicki M, *Savadjiev P, *Pasternak O, Crow TJ, James AC, DeLisi L, **Shenton ME**. Beyond “white matter integrity” disruptions in schizophrenia. Poster presented at the *International Congress of Schizophrenia Research*, Orlando, Florida, 2013.
- A404. *Pasternak O, Westin C-F, *Bouix S, Seidman L, *Goldstein J, Woo T, Petryshen T, Mesholam-Gately R, McCarley R, Kikinis R, **Shenton M**, *Kubicki M. Global white matter inflammation pattern in first-episode

schizophrenia – A free-water MRI study. Poster presented at the *International Congress of Schizophrenia Research*, Orlando, Florida, 2013.

- A405. *Whitford TJ, *Kubicki M, *Pelavin PE, *Lucia D, *Schneiderman JS, Pantelis C, McCarley RW, **Shenton ME**. Delusions of control and structural integrity of the cingulum bundle in patients with schizophrenia. Poster presented at the *International Congress of Schizophrenia Research*, Orlando, Florida, 2013.
- A406. Seidman LJ, Mesholam-Gately RI, Bergen SE, Stone W, Wojcik JD, Woodberry K, Cousins A, Friedman-Yakoobian M, Giuliano A, Gnong-Granato A, Rodenheiser-Hall J, Hornbach S, Francis G, Pilo C, Gibson LE, Serum R, Min G, Hallinan S, Frazier J, Keshavan M, *Goldstein JM, **Shenton M**, Petryshen T, Woo T-U, McCarley RW. Progression of neurocognitive impairment from at-risk to chronic phases of schizophrenia in the Boston CIDAR study. Poster Symposium 1-3 entitled “Staging of Progression in Schizophrenia in the Boston CIDAR: From Phenotype to Genotype, Chair Dr. Tracey Petryshen, Co-Chair Dr. Martha Shenton, presented at the *International Congress of Schizophrenia Research*, Orlando, Florida, 2013.
- A407. *Goldstein JM, Abbs B, Thermenos H, Juelich R, Longenecker J, Mesholam-Gately R, Woodbury K, **Shenton M**, McCarley RW, Seidman LJ. Sex differences in the developmental trajectory of verbal memory deficits in schizophrenia. Poster Symposium 1-3 entitled “Staging of Progression in Schizophrenia in the Boston CIDAR: From Phenotype to Genotype, Chair Dr. Tracey Petryshen, Co-Chair Dr. Martha Shenton, presented at the *International Congress of Schizophrenia Research*, Orlando, Florida, 2013.
- A408. McCarley RW, Del Re E, Oribe N, Hirano Y, *Spencer K, *Niznikiewicz M. Abnormal auditory and visual event-related potentials in prodromal and first episode schizophrenia subjects and their clinical correlates. Poster Symposium 1-3 entitled “Staging of Progression in Schizophrenia in the Boston CIDAR: From Phenotype to Genotype, Chair Dr. Tracey Petryshen, Co-Chair Dr. **Martha Shenton**, presented at the *International Congress of Schizophrenia Research*, Orlando, Florida, 2013.
- A409. Petryshen T, Bergen S, Mesholam-Gately R, Del Re E, Purcell S, Seidman LJ, McCarley R. Genetic determinants of abnormalities in brain function in schizophrenia. Poster Symposium 1-3 entitled “Staging of Progression in Schizophrenia in the Boston CIDAR: From Phenotype to Genotype, Chair Dr. Tracey Petryshen, Co-Chair Dr. **Martha Shenton**, presented at the *International Congress of Schizophrenia Research*, Orlando, Florida, 2013.
- A410. *Levitt JL, *Rathi Y, Raviv TR, *Eckbo R, Simpson JC, McCarley RW, **Shenton ME**. MR-DTI frontostriatal tractography findings in chronic schizophrenia. Poster presented at the *International Congress of Schizophrenia Research*, Orlando, Florida, 2013.
- A411. Mauney S, Pietersen CY, *Goldstein JM, Petryshen T, Seidman LJ, **Shenton ME**, McCarley RW, Woo TW. Gene expression profiling of oligodendrocytes in dorsolateral prefrontal cortex deep white matter in bipolar disorder and schizophrenia. Poster presented at the *International Congress of Schizophrenia Research*, Orlando, Florida, 2013.
- A412. Mesholam-Gately RI, Hallinan SB, Hornbach S, Stone WS, Frances G, Pilo C, Gibson LE, Wojcik JD, Woodberry K, Cousins A, Friedman-Yakoobian M, Giuliano AJ, Gnong-Granato A, Rosenheiser-Hill J, Serur R, Min G, Keshavan M, *Goldstein JM, **Shenton M**, Petryshen T, Berger SE, Woo TW, McCarley RW, Seidman LJ. Staging of olfactory functioning from at-risk to chronic phases of schizophrenia in the Boston CIDAR study. Poster presented at the *International Congress of Schizophrenia Research*, Orlando, Florida, 2013.
- A413. Seidman LJ, Mesholam-Gately RI, Bergen SE, Stone W, Wojcik JD, Woodberry K, Cousins A, Friedman-Yakoobian M, Giuliano A, Gnong-Granato A, Rodenheiser-Hall J, Hornback S, Francis G, Pilo C, Gibson LE, Serur R, Min G, Hallinan S, Frazier J, Keshavan M, *Goldstein JM, **Shenton M**, Petryshen T, Woo TW, McCarley RW. Progression of neurocognitive impairment from at-risk to chronic phases of schizophrenia in the Boston CIDAR study. Poster presented at the *International Congress of Schizophrenia Research*, Orlando, Florida, 2013.

- A414. *Asami T, *Whitford T, *Bouix S, *Dickey C, *Niznikiewicz M, **Shenton M**, Voglmaier M, McCarley R. Globally and locally reduced gray matter volumes in neuroleptic-naïve men with schizotypal personality disorder: Association with negative symptoms. *The 11th World Congress of Biological Psychiatry*, June 24, 2013, Kyoto, Japan.
- A415. *Hosokawa T, **Shenton M**, *Niznikiewicz M, *Salisbury D, McCarley R. Parietal lobe volume deficit in first-episode schizophrenia: Longitudinal study of gray matter volume. *The 11th World Congress of Biological Psychiatry*, June 25, 2013, Kyoto, Japan.
- A416. *Saito Y, *Kubicki M, *Otsuka T, *Asami T, *Rathi Y, *Pasternak O, *Eckbo R, *Kikinis Z, *Clemm C, *Koerte I, Roppongi T, Kinoshita T, **Shenton M**. Motor related white matter abnormalities in patients with first-episode schizophrenia. Poster presented at *The 11th World Congress of Biological Psychiatry*, June 26, 2013, Kyoto, Japan.
- A417. *Kikinis Z, *Green K, *Giwerc M, *Bouix S, Makris N, *Levitt JJ, Corfas G, Kucherlapati R, Kikinis R, *Kubicki M, **Shenton ME**. Genetic variant in the proline dehydrogenase gene is associated with demyelination of brain white matter and severity of clinical symptoms in schizophrenia patients. *XXIst Meeting of The World Congress of Psychiatric Genetics*. October 17-21, 2013, Boston, MA.
- A418. *Levitt JJ, *Kikinis Z, *Green K, *Dahlben B, *Rathi Y, **Shenton ME**. Impact of Genetic Variation in the Proline Dehydrogenase Gene on Deafferentation of the Striatum in Schizophrenia. *XXIst Meeting of The World Congress of Psychiatric Genetics*. October 17-21, 2013, Boston, MA.
- A419. *Kikinis Z, *Green K, *Giwe M, *Bouix S, Makris N, Schreiber N, Corfas G, Kucherlapati R, Kikinis R, *Kubicki M, **Shenton ME**. Associations of the rs4818 polymorphism in the COMT gene with demyelination of the inferior longitudinal fasciculus in the white matter of the brain and cognition in schizophrenia patients. *American Society of Human Genetics*, October 22-26, 2013, Boston, MA.
- A420. *Panenka WJ, Lange RT, Shewchuk JR, Heran MKS, Brubacher JR, *Bouix S, *Eckbo R, **Shenton ME**, Iverson GL. Biopsychosocial outcome from complicated versus uncomplicated mild traumatic brain injury. *International Brain Injury Association Tenth World Congress on Brain Injury (IBIA)*. March 2014. San Francisco, USA.
- A421. *Pasternak O, *Bouix S, *Rathi Y, Branch C, Westin C-F, **Shenton ME**, Lipton M. Characterization of Acute Diffusion MRI Abnormalities following Concussion using a Joint Distribution Free-Water Imaging Normative Atlas. *International Brain Injury Association Tenth World Congress on Brain Injury (IBIA)*. March 2014. San Francisco, USA.
- A422. *Pasternak O, Stern RA, *Giwe MY, *Yergatian C, Merugumala S, Liao H, Baugh CM, Westin C-F, **Shenton ME**, *Lin AP. Identification of Atrophy, Excitotoxicity and Gliosis in the White Matter of Retired NFL Players. *International Brain Injury Association Tenth World Congress on Brain Injury (IBIA)*. March 2014. San Francisco, USA.
- A423. *Koerte IK, *Mayinger M, *Green K, *Giwe M, *Dahlben B, *Fredman E, *Eckbo R, Baugh CM, *Stamm J, Makris N, *Lin AP, *Pasternak O, *Rathi Y, Stern RA, **Shenton ME**. White matter microstructure and cortical thickness in former NFL players. *International Brain Injury Association Tenth World Congress on Brain Injury (IBIA)*. March 2014. San Francisco, USA.
- A424. *Bouix S, Cai P, *Pasternak O, Zafonte R, **Shenton ME**. Subject-Specific Evaluation of mTBI with Diffusion MRI: Statistical Considerations. *International Brain Injury Association Tenth World Congress on Brain Injury (IBIA)*. March 2014. San Francisco, USA.
- A425. **Shenton ME**, *Koerte IK, *Bouix S, *Pasternak O, *Lin AP, *Mayinger M, *Coleman M, *Dahlben B, *Giwe M, *Green K, *Stamm J, Helmer K, Zafonte R, Stern R. Invited Symposium on Chronic Traumatic Encephalopathy, "Advanced Neuroimaging in CE and Repetitive Concussive and Subconcussive Head Trauma". *International Brain Injury Association Tenth World Congress on Brain Injury (IBIA)*. March 2014. San Francisco, USA.

- A426. *Pasternak O, Stern RA, *Giwerc M, *Yergatian C, Merugumala S, Liao H, Baugh CM, Westin C-F, **Shenton ME**, *Lin AP. The relation between free-water, atrophy and microstructural pathologies in NFL players – A combined diffusion MRI and MRS study. *International Society for Magnetic Resonance Imaging in Medicine (ISMRM)*; May, 2014, Milan, Italy).
- A427. *Duskin J, *Dahlben B, *Fredman E, *Eckbo R, Assaf Y, **Shenton M**, *Kubicki M, *Pasternak O. FreeSurfer analysis of volumetric changes in gray and white matter in multiple sclerosis patients. Poster presented at the 22nd *Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, May 19, 2014.
- A428. *del Re E, Gao Y, *Eckbo R, Petreyshen TL, Seidman LJ, Goldstein JM, McCarley RW, **Shenton ME**, *Bouix S. Multi-atlas brain masking for MRI analysis: Comparison with FreeSurfer 5.3 and manual Masking. Poster presented at the 22nd *Harvard Psychiatry Annual Research Day*, Sponsored by the Mysell Committee, Department of Psychiatry, Harvard Medical School, May 19, 2014.
- A429. *Kikinis Z, *Choi K-I, Coman IL, Radoeva P, *Bouix S, *Ekbo R, Makris N, *Kwon JS, *Kubicki M, Kates WR, **Shenton ME**. Developmental abnormalities in brain white matter in prodromes with 22q11.2 deletion syndrome: a tract based spatial statistics study. To be presented at the *ISDN conference on Development, Function and Disorder of the Nervous System*, 19-24 July 2014, Montreal, Canada.
- A430. Sitek A, Kijewski MF, Park M-A, Pan H, *Coleman MJ, Epstein JI, Belanger AP, Dubey S, Leung L, *Giwerc MY, *Green K, *Dahlben BA, *Fredman ES, Sohn RL, Wang S, Semer J, Sicka W, Seaver K, Paolino JM, El Fakhri G, Zafonte RD, **Shenton ME**, Stern E. Posterior analysis of compartmental kinetic modeling in PET. Poster presented at *IEEE Nuclear Science Symposium & Medical Imaging Conference (NSS/MIC), Semiconductor X-Ray and Gamma-Ray Detectors*, 2014, Seattle, Washington.
- A431. *Kikinis Z, Porter CL, *Pasternak O, *Muehlmann M, *Rathi Y, *Koerte IK, Peled S, Ferris C, Kristal BS, **Shenton ME**. Improving imaging of diffuse axonal injury in traumatic brain injury. Poster presented at the *Military Health System Research Symposium*, August 19, 2014, Fort Lauderdale, FL.

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA

IN RE: NATIONAL FOOTBALL LEAGUE
PLAYERS' CONCUSSION INJURY
LITIGATION

No. 2:12-md-02323-AB
MDL No. 2323

Kevin Turner and Shawn Wooden,
*on behalf of themselves and
others similarly situated,*

Plaintiffs,

v.

National Football League and
NFL Properties, LLC,
successor-in-interest to
NFL Properties, Inc.,

Defendants.

THIS DOCUMENT RELATES TO:
ALL ACTIONS

DECLARATION OF Charles Bernick, MD, MPH

Charles Bernick affirms under penalty of perjury the truth of the following facts:

1. I am Associate Director, Cleveland Clinic Lou Ruvo Center for Brain Health. My *curriculum vitae* is attached as Exhibit A.
2. I have been asked to submit this declaration in support of the objection to the proposed class action settlement in the above captioned case filed by the MoloLamken LLP law firm. I am not being compensated for my work in doing so.
3. Chronic traumatic encephalopathy (or CTE) is a unique neurodegenerative disease; it is not the same as ALS, Alzheimer's disease, or Parkinson's disease.
4. Repetitive brain trauma is a necessary condition for developing CTE.

5. ALS, Alzheimer's disease, and Parkinson's disease are found in the general population of individuals who have not suffered repetitive brain trauma. Suicidality does not present as a symptom of these diseases.

6. Mood and behavioral impairments such as depression, suicidality, hopelessness, impulsivity, explosiveness, rage, and aggression, although present in the general population, appear more frequently in individuals suffering from CTE than in the general population.

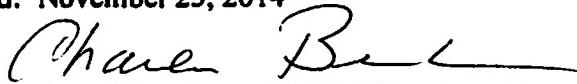
7. The mood and behavioral impairments associated with CTE can present prior to the onset of CTE-related dementia and can be the cause of significant disability and distress for the patient.

8. Based on my experience and knowledge of the clinical and scientific literature, I believe that a reliable, valid, and clinically accepted diagnosis of CTE, based, in part, on objective biomarkers, will likely be possible in the next decade, if not sooner, and long before the 65-year term of the proposed NFL Concussion Litigation Settlement expires.

9. I am not aware of the use of the diagnostic or classification categories of "Neurocognitive Impairment Level 1.0," "Neurocognitive Impairment Level 1.5," or "Neurocognitive Impairment Level 2.0" anywhere in the medical or scientific community.

Pursuant to 28 U.S.C. § 1746, I state under penalty of perjury that the foregoing is true and correct.

Dated: November 25, 2014



Charles Bernick, MD, MPH

Exhibit A

CURRICULUM VITAE -August, 2014

CHARLES BERNICK, M.D
8808 Cortile Dr.
Las Vegas, NV 89134

Personal Data:

Born: February 11, 1955
Los Angeles, California

Medical Licensure: Nevada #6978

Education:

BA Rice University, Department of History, 1972-1976
Houston, Texas
Honors: Phi Beta Kappa

MD University of Texas Southwestern Medical School, Dallas, Texas Honors: Alpha Omega Alpha 1976-1980

Mt. Zion Hospital 1980-1981
San Francisco, California
Internship, Internal Medicine

University of Arizona Health Science Center 1984-1986
Tucson, Arizona
Fellowship, Neurology and Neuromuscular Disorders

MPH University of Nevada, Las Vegas 2011
Las Vegas, NV

Experience:

Associate Medical Director, Cleveland Clinic Lou Ruvo Center for Brain Health 2009 - Present

Professor of Neurology University of Nevada School of Medicine Las Vegas, NV	2002 - 2009
Chief Division of Neurology University of Nevada School of Medicine Las Vegas, Nevada	1994-2005
Director, American Parkinson's Disease Association Information and Referral Center	1998-2011
Clinical Assistant Professor Alzheimer's Disease Diagnostic and Treatment Center U.C. Davis Medical Center, Sacramento, California	1987-1993
Staff Neurologist Medical Clinic of Sacramento Sacramento, CA	1986-1993
Medical Director Eskaton's Alzheimer's Disease Special Units Sacramento, California	1992-1993
Attending Neurologist Muscular Dystrophy Association Neuromuscular Clinic Sacramento, California	1986-1993
Instructor of Neurology University of Arizona College of Medicine Tucson, Arizona	1985-1986
Medical Director Alzheimer's Disease Special Care Unit Desert Life Health Care Center, Tucson, Arizona	1985-1986
<u>Board Certification:</u>	
Diplomate American Board of Psychiatry and Neurology American Board of Electrodiagnostic Medicine	1987 1989
<u>Professional Activities:</u>	
Member, State of Nevada Alzheimer's Disease Task Force	2012
President, Nevada Lifespan Respite Coalition	2007 -2011
Member, UNLV Gerontology Community Advisory Committee	2007 - 2009
Member American Academy of Neurology	1981- Present
Committee Member, Board of Directors, National Alzheimer's	

Association	1999-2000
Member, Medical Advisory Committee, Desert Southwest Chapter,	
Alzheimer's Association	2006 - Present
Member, State of Nevada Alzheimer's Advisory Board	2000-2006
Member, Alzheimer's Association Public Policy Committee	2002- 2003
Board of Directors, Southern Nevada Alzheimer's Association	1994-2000
Reviewer, Alzheimer's Association Medical & Scientific Group	2000-Present
Member, Advisory Board, College of Sciences, UNLV	2000
Member, Advisory Board, Nevada Geriatric Education Center	1994-Present
Member, Geriatric Neurology Section, American Academy of Neurology	1993-Present
Member, Alzheimer's Disease Neurology Education Council	1997
Board of Directors, Jewish Family Services	1996-1997
Board of Directors, Visiting Nurses Association	1990-1992
Professional Advisory Committee, Multiple Sclerosis Society	1990-1993
Qualified-Medical Examiner, Industrial Medical Council,	1992-1993
State of California	

Bibliography:

Bernick C, Gregorios J: Progressive Multifocal Leukoencephalopathy in a patient with Acquired Immune Deficiency Syndrome. **Arch Neurol** 41:780782, 1984.

Bernick C, Stern LZ: Neurologic Complaints in the Elderly. **Postgrad Med.** 77(8):124-138, 1985.

Bernick C, Stern LZ: Restless Legs Syndrome (revised). **The Western J Med.** 145: 263-265, 1986

Bernick C, Stern LZ: Spontaneous, Isolated, Mesencephalic Hemorrhage. **Neurology** 36:1627, 1986.

Bernick C, Stern LZ: Mental Disorders in the Elderly. **Comp Therapy** 13 (5):43-50, 1987.

Bernick C: Methysergide Induced Askathisia. **Clin Neuropharm** 11:87-89, 1988.

Bernick C, Davis M: Ictal Perseveration? **Neurology** 38:826, 1988.

Bernick C: Sleep Disturbances in Alzheimer's Disease. **AM J Alzheimer's Care and Research** 3:8-11, 1988.

Bernick C: Familial Hypokalemic Periodic Paralysis. **Nerve & Muscle** 11: 10921093, 1988.

Weilder P, Mungas D, Bernick C: Propanolol for the Control of Disruptive Behavior in Senile Dementia. **J Geriatric Psychiatry Neorol** 1: 226-230, 1988.

Mungas D, Cooper J, Weilder P, Bernick C: Dietary Preference for Sweet Foods in

Patients with Dementia. **JAGS** 38:999-1007, 1990.

Bernick C, Stern LZ: Muscle Cramps and Motor System and Gait. In Walker HK, Hall W, Hurst JW (eds) **Clinical Methods** Butterworths, Stoneham, MA, 1990, pp281-284, 351-355

Heckbert S, Longstreth W, Psaty B, Murros K, Smith N, Newman A, Williamson J, Bernick C, Furburg C: The Association of Antihypertensive Agents with MRI White Matter Findings and with Modified Mini-Mental State Examination in Older Adults. **JAGS** 45:1423-1433, 1997

Longstreth W, Bernick C, Manolio T, et al. Lacunar Infarcts Defined by Magnetic Resonance Imaging, the Cardiovascular Health Study. **Arch Neurol** 1998; 55: 1217-1225

Longstreth W, Bernick C, Fitzpatrick A, Cushman M, Knepper L, Lima J, Furberg C. Frequency and Predictors of Stroke death in 5,888 Participants in the Cardiovascular Health Study. **Neurology** 2001; 56:368-375

Bernick C, Kuller L, Dulberg C, Longstreth W, et al. Silent MRI Infarcts and the Risk of Future Stroke: The Cardiovascular Health Study. **Neurology** 2001;57:1222-1229

Longstreth WT, Katz R, Olson J, Bernick C, Carr JJ, Manilow MR, Hess DL, Cushman M, Schwartz SM. Plasma total homocysteine levels and cranial magnetic resonance imaging findings in elderly persons: the Cardiovascular Health Study. **Arch Neurol**. 2004; 61:67-72

Kuller L, Longstreth WT, Arnold A, Bernick C, Bryan RN, Beauchamp N. White matter hyperintensity on cranial magnetic resonance imaging- a predictor of stroke. **Stroke** 2004; 35: 1821-1825

Longstreth W, Katz R, Olson J, Bernick C, Carr J, Malinow M, Hess D, Cushman M, Schwartz S. Plasma total homocysteine levels and cranial MRI findings in elderly persons: The Cardiovascular Health Study. **Arch Neurol** 2004; 61: 67-72

Bernick C, Katz R, Smith N, Rapp S, Bhadelia R, Carlson M, Kuller L. Statins and Cognitive Function in the Elderly: The Cardiovascular Health Study. **Neurology** 2005; 65: 1388-1394

Rea T, Breitner J, Psaty B, Fitzpatrick A, Lopez O, Newman A, Hazzard W, Zandi P, Burke G, Lyketsos C, Bernick C, Kuller L. Statins and the Risk of Incident Dementia: The Cardiovascular Health Study. **Archives of Neurol** 2005; 62:1047-51

Baker ML, Marino Larsen EK, Kuller LH, Klein R, Klein BE, Siscovick DS, Bernick C, Manolio TA, Wong TY. Retinal microvascular signs, cognitive function, and dementia in older persons, The Cardiovascular Health Study. **Stroke**. 2007; 38: 2041-7

Barzilay J, Fitzpatrick A, Luchsinger J, Yasar S, Bernick C, Jenny N, Kuller L. Albuminuria and dementia in the elderly: a community study. *Am J Kidney Dis* 2008; 52: 216-26

Longstreth WT, Arnold AM, Kuller LH, Bernick CB, Lefkowitz DS, Beauchamp NJ, Manolio TA. Progression of MRI defined brain vascular disease predicts vascular events in the elderly. *Stroke* 2011; 42

Raji CA, Lopez OL, Kuller LH, Carmichael OT, Longstreth WT, Gach M, Boardman J, Bernick C, Thompson PM, Becker JT. White matter lesions and brain gray matter volume in cognitively normal elders. *Neurobiology of Aging* 2012; 33: e7-e16

Bernick C, Cummings J, Ramen R, Sun Y, Aisen P. Age and rate of cognitive decline in Alzheimer's disease: Implications for clinical trials. *Arch Neurol* 2012; 69: 901-905

Bernick C, Banks S, Phillips M, et al. Professional Fighters Brain Health Study: Rationale and Methods. *AJE* 2013;178:280-286

Ryan J., Pakhomov S., Marino S., Bernick C., and Banks S., (2013) Computerized Analysis of a Verbal Fluency Test. *Computational Linguistics*, in press

Bernick C., and Banks, S.J., What boxing tells us about repetitive head trauma and the brain. *Alzheimer's Research and Therapy* 2013; S:23

Shin W., Mahmoud S., Sakaie K., Banks S.J., Lowe, M.J., Phillips M., Modic M.T., Bernick C. Diffusion measures indicate fight exposure-related damage to cerebral white matter in boxers and mixed martial arts fighters. *American Journal of Neuroradiology*, 2014 Feb;35(2):285-90.

Banks SJ, Obuchowski N, Shin W, Lowe M, Phillips M, Modic M, **Bernick C.** The protective effect of education on cognition in professional fighters. *Arch Clin Neuropsychol.* 2014 Feb;29(1):54-9

Banks S.J., Mayer B., Shin W., Lowe M., Phillips M., Modic M., Bernick C. Impulsiveness in professional fighters. *Journal of Neuropsychiatry and Clinical Neurosciences*, 2014 Winter;26(1):44-50

Cummings J, Zhong K, Bernick C. The Cleveland Clinic Lou Ruvo Center for Brain Health: Keeping Memory Alive. *Journal of Alzheimer's Disease* 2014;38(1):103-9

Abstracts:

Bernick C, Lee S, Sandyk R, Stern LZ: Effects of L-Dopa in the Uremic Patients with Restless Legs Syndrome. (Thirty-Eighth Annual Meeting of the American Academy of Neurology, New Orleans, May 1986.)

Bernick C, Longstreth WT, Manolio TA, Jungreis CA, Price TR: Clinical Factors Associated with Lacunes on Cranial Magnetic Resonance Imaging of 3,660 Elderly People. (Twenty-Second International Joint Conference on Stroke and Cerebral

Circulation By the American Heart Association, Anaheim, February, 1997.)

Heckbert SR, Longstreth WT, Psaty BM, Murros KE, Smith NL, Bernick C, Furberg CD: Association of Anti Hypertensive Agents with MRI White Matter Findings and Mini Mental State Score in Older Adults. (Fourth International Conference on Preventive Cardiology, Montreal, June, 1997.)

Bernick C, Saxena S. Use of Mirtazapine for Agitated Behaviors in Alzheimer's Disease (American Neuropsychiatric Association, January, 1999, New Orleans)

Bernick C, Fitzpatrick A, Longstreth W, Cushman M, Furburg C. Death From Stroke (American Academy of Neurology, April, 1999, Toronto)

Bernick C, Kranthi D, Norquiera A. Psychosis and Serotonergic Agents in Alzheimer's Disease (Southern Medical Association, Nov. 2000)

Bernick C, Kuller L, Dulberg C, Longstreth W, Manolio T, Beauchamp N, Price T. Silent MRI Infarcts and the Risk of Future Stroke (American Heart Association, Nov., 2000, New Orleans)

Bernick C, Kuller L, Dulberg C, Longstreth W, Manolio T, Beauchamp N, Price T. Silent Brain MRI Infarcts and Subsequent Stroke Type (American Stroke Association, Feb. 2001, Ft. Lauderdale)

Beauchamp N, Kuller L, Longstreth W, Arnold A, Bernick C, Bryan R. T2 Weighted White Matter Hyperintensity on Cerebral MRI - A Predictor of Stroke (American Academy of Neurology, April 2002, Denver)

Bernick C, Katz R, Rapp S, Smith R, Bhadelia R, Carlson M, Kuller L. Cholesterol, Statins and Cognitive Function in the Elderly: The Cardiovascular Health Study (American Academy of Neurology, April 2003, Honolulu)

Fitzpatrick A, Kuller L, Lyketsos C, Lopez O, Longstreth W, Bernick C, Cushman M, Burke G, Malinow R. Associations Between Plasma Homocysteine and Type of Dementia. (Society of Epidemiologic Research, June, 2003, Atlanta)

Bernick C. Thiamine in Alzheimer's Disease (Southern Medical Association, November 2004, New Orleans)

Bernick C, Young K. Failure to Recognize Depression in Parkinson's Disease on the UPDRS (American Academy of Neurology, 2006, San Diego)

Bernick C, Young K. Verbal Fluency as a Measure of Severity of Alzheimer's Disease (Southern Medical Assn, October, 2006)

Bernick C. Rural Dementia Care Via Telemedicine (Southern Medical Association, November, 2007, New Orleans)

Bernick C, Goldstein J, Earl N. Ropinirole 24 hour improves disease specific symptoms when used as adjunctive therapy to L-dopa in patients with advanced PD

(Gerontological Society of America Annual Scientific Meeting, November, 2007, San Francisco)

Fredericks D, Bernick C, Dinwiddie L, Charles P. Dementia care in the frontier: use of telemedicine in rural Nevada (ICAD, July, 2008, Chicago)

Bernick C, Kelley K, Sholar M. Seizure like episodes in Alzheimer's Disease (Southern Medical Association, August, 2008, Nashville)

Bernick C, Simmons S, Sholar M. Use of the Luria 3 Step motor sequencing test as a measure of cognitive function in dementia screening. (American Academy of Neurology, April, 2011, Honolulu)

Bernick C, Lopez O, Chang Y, Becker J. Modifiers of trajectory to Alzheimer's disease (AAIC, July, 2011, Paris)

Bernick C, Banks S, Phillips M, Lowe M, Jones S, Shin W, Modic M. The threshold effect of repeated head trauma on brain structure and cognition: The Professional Fighters Brain Health Study (American Academy of Neurology, April, 2012, New Orleans)

Mayer, B., Banks, S., Bernick, C. Impulsiveness in professional fighters. (American Psychological Foundation, Chicago, IL, June 2012)

Shin, W., Mathew, B., Banks, S. Lowe, M., Phillips, M., Modic, M., Bernick, C. MRI volume and diffusion measures indicate fight exposure-related damage to white matter in fighters (*Human Brain Mapping*, Beijing, China, June 2012).

Banks, S.J., Shin, W., Lowe, M., Phillips, M., Modic, M., Bernick, C. The protective effect of education in professional fighters (*Midyear meeting of the International Neuropsychological Society*, Oslo, Norway, July 2012)

Bernick C, Banks S., Obuchowski N, Shin W, Weights and Volumetric Measures: The Effect of Weight Class on Brain Volume in Professional Combatants (AAN, San Diego, April 2013)

Bernick C, Banks S., Shin W, Lowe M, Phillips M, Jones S, Modic M, Structural and Functional Brain Changes in Boxers and Mixed Martial Arts Fighters are correlated with fight exposure (AAN, San Diego, April 2013)

Bernick C., Banks S., Obuchowski N., Shin W. Weights and Volumetric Measures: The Effect of Weight Class on Brain Volume in Professional Combatants (AAN, San Diego, April 2013)

Bernick C, Banks S, Shin w, et al. Third ventricular volume and repetitive head trauma: The Professional Fighters Brain Health Study (OHBM, Seattle, June, 2013)

Bernick C, Simmons S, Banks S. The effect of age of starting a contact sport on

subsequent brain volumes (AAIC, Boston, July 2013)

Bernick C, Banks S, Obuchowski N. Predicting Low Cognitive Function in Professional Fighters. (10th World Congress on Brain Injury, San Francisco, March, 2014)

Banks S, Obuchowski N, Bernick C. Longitudinal Change in Brain Health in Professional Fighters (10th World Congress on Brain Injury, San Francisco,

Bernick C, Banks S, Obuchowski N. Thalamic Volumes and Exposure to Head Trauma in Retired Professional Fighters (American Academy of Neurology, Philadelphia, April, 2014)

Bernick C, Banks S, Obuchowski N. MRI Volumetrics for Longitudinal Assessment of Repetitive Head Trauma. (AAN Sports Concussion, Chicago, July, 2014)

Banks S, Shin W, Lowe M, Phillips M, Modic M, Bernick C. Cognitive Deficits in Retired Fighters (AAIC, Copenhagen, July, 2014)

Pharmaceutical Studies

Principal Investigator, A 16 week Open-Label Safety Study of Tacrine with Monitoring of ALT, 1994

Principal Investigator, 48 Week Efficacy and Safety Study of Propentofylline in Patients with Alzheimer's Disease, 1995

Principal Investigator, 26 Week Efficacy and Safety Study of Propentofylline in Vascular Dementia, 1995

Principal Investigator, 16 Week Dose Response Study of Tacrine GITS, 1996

Principal Investigator, 26 Week Dose Finding Study Investigating the Efficacy and Safety of Lu 25-109 in Patients With Alzheimer's Disease, 1997

Principal Investigator, Open Label Safety and Efficacy Study of Exelon in Patients with Alzheimer's Disease in the Community Setting, 1997

Principal Investigator, 12 Month Safety and Efficacy Trial of Idebenone in Patients with Alzheimer's Disease, 1997

Principal Investigator, 6 Month Safety and Efficacy Study of Mementane in Alzheimer's Disease, 1998

Principal Investigator, 7 Week Safety and Efficacy Study of Pre-gabalin in Chronic Low Back Pain, 1998

Principal Investigator, Safety and Efficacy Study of Vitamin E and Donepezil to Delay Clinical Progression from Mild Cognitive Impairment to Alzheimer's Disease, 1999

Principal Investigator, Melatonin for Sleep Disturbance in Alzheimer's Disease, 1999

Principal Investigator, A Multicenter Trial of Rofecoxib and Naproxen in Alzheimer's Disease, 1999

Principal Investigator, Safety and Efficacy Study of Pregabalin in Post Herpetic Neuralgia, 2000

Principal Investigator, Safety and Efficacy Study of Apomorphine in Parkinson's Disease, 2000

Principal Investigator, Tolerability and Effect of Entacapone in Parkinson's Subjects with End of Dose Wearing Off Symptoms, 2000

Principal Investigator, Donepezil in Severe Alzheimer's Disease, 2001

Principal Investigator, Safety and Efficacy Study of FK960 in Subjects with Mild to Moderate Alzheimer's Disease, 2001

Principal Investigator, Healthy Aging and Memory Study, 2002

Principal Investigator, Treatment of Agitation/Psychosis in Dementia/Parkinsonism, 2002

Principal Investigator, Reducing Homocysteine to Slow Cognitive Decline in Alzheimer's Disease, 2003

Principal Investigator, Dose Ranging, Safety and Efficacy Evaluation of NS 2330 in Mild to Moderate Alzheimer's Disease, 2003

Principal Investigator, Valproate to Attenuate the Progression of Alzheimer's Disease, 2004

Principal Investigator, Natural Huperzine A in Alzheimer's Disease, 2004

Principal Investigator, Evaluation of ONO 2506PO in Patients with Mild to Moderate Alzheimer's Disease, 2004

Principal Investigator, Safety and Efficacy of FK962 in Mild to Moderate Alzheimer's Disease, 2004

Principal Investigator, Efficacy and Safety of Donepezil in Subjects with Mild Cognitive Impairment, 2004

Principal Investigator, Donepezil in Hispanic Individuals, 2006

Principal Investigator, Alzheimer's Disease Neuroimaging Initiative, 2006

Principal Investigator, Efficacy and tolerability of E2007 as an adjunctive therapy in levodopa treated Parkinson's Disease patients with motor fluctuations, 2007

Principal Investigator, Efficacy and safety of Solvay in Parkinson's Disease patients, 2007

Principal Investigator, Home Based Assessments, 2008

Principal Investigator, Efficacy and Safety of ELND005 in mild to moderate Alzheimer's disease, 2008

Principal Investigator, Efficacy and Safety of Bapineuzumab in mild to moderate Alzheimer's Disease, 2008

Principal Investigator, Efficacy and Safety of T-817MA in mild to moderate Alzheimer's Disease, 2008

Principal Investigator, Efficacy and Safety of TTP488 in mild to moderate Alzheimer's Disease, 2008

Principal Investigator, Efficacy and Safety of IVIgG in mild to moderate Alzheimer's Disease, 2009

Principal Investigator, Efficacy and Safety of Dimebon in combination with donepezil in mild to moderate Alzheimer's Disease, 2009

Principal Investigator, Safety and pharmacodynamic and pharmacokinetic effects of BMS-708 163 in the treatment of patients with prodromal Alzheimer's disease, 2010

Principal Investigator, Efficacy and Safety of Preladenant in early Parkinson's disease, 2011

Principal Investigator, Amyloid Imaging PET and safety trial of ACC-001 in early Alzheimer's disease, 2011

Principal Investigator, Impact of Florbetapir F 18 PET on the clinical diagnosis and management of patients with progressive cognitive decline, 2011

Principal Investigator, Performance of Aclarus DxTM in US patients suffering from memory impairment, 2011

Principal Investigator, A Phase 2, Multicenter, 24-Month, Randomized, Third-Party Unblinded, Placebo-Controlled, Parallel-Group Amyloid Imaging Positron Emission Tomography (PET) And Safety Trial of ACC-001 and QS-21 Adjuvant in Subjects with Early Alzheimer's Disease, 2012

Principal Investigator, A Randomized, Double-Blind, Placebo-Controlled,

Parallel-Group, Multicenter, Phase II Study to Evaluate the Impact of MABT5102A on Brain Amyloid and Related Biomarkers in Patients With Mild to Moderate Alzheimer's Disease, 2012

Principal Investigator, Phase II Study to Evaluate The Impact on Biomarkers of Resveratrol Treatment in Patients with Mild to Moderate Alzheimer's Disease, 2012

Principal Investigator, Effects of NeuroAD system, Combined TMS Stimulation and Cognitive Training, on the Cognitive Function of Mild to Moderate Alzheimer Patients: A Single-Center Randomized, Double-Blind, Placebo Controlled Study, 2013

Principal Investigator, A 26-Week, Double-blind, Randomized, Placebo-controlled, Parallel-group Study to Investigate the Effects of Daily Administration of AC-1204 in Participants with Mild to Moderate Alzheimer's Disease (AD) 2013

Epidemiological Studies

Principle Investigator, ADNI 2, 2011-Present

Principle Investigator, Professional Fighters Brain Health Study, 2011-Present

**UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA**

IN RE: NATIONAL FOOTBALL LEAGUE
PLAYERS' CONCUSSION INJURY
LITIGATION

No. 2:12-md-02323-AB
MDL No. 2323

Kevin Turner and Shawn Wooden,
*on behalf of themselves and
others similarly situated,*

Plaintiffs,

v.

National Football League and
NFL Properties, LLC,
successor-in-interest to
NFL Properties, Inc.,

Defendants.

THIS DOCUMENT RELATES TO:
ALL ACTIONS

DECLARATION OF MICHAEL WEINER

Michael Weiner affirms under penalty of perjury the truth of the following facts:

1. I am a Professor in Radiology and Biomedical Engineering, Medicine, Psychiatry, and Neurology. My curriculum vitae is attached as Exhibit A.
2. I have been asked to submit this declaration in support of the objection to the proposed class action settlement in the above captioned case filed by the MoloLamken LLP law firm. I am not being compensated for my work in doing so.
3. Chronic traumatic encephalopathy (or CTE) is a unique neurodegenerative disease; it is not the same as ALS, Alzheimer's disease, or Parkinson's disease.
4. Repetitive brain trauma is a necessary condition for developing CTE.

5. ALS, Alzheimer's disease, and Parkinson's disease are found in the general population of individuals who have not suffered repetitive brain trauma. Suicidality does not present as a symptom of these diseases.

6. Mood and behavioral impairments such as depression, suicidality, hopelessness, impulsivity, explosiveness, rage, and aggression, although present in the general population, appear more frequently in individuals suffering from CTE than in the general population.

7. The mood and behavioral impairments associated with CTE can present prior to the onset of CTE-related dementia and can be the cause of significant disability and distress for the patient.

8. Based on my experience and knowledge of the clinical and scientific literature, I believe that a reliable, valid, and clinically accepted diagnosis of CTE, based, in part, on objective biomarkers, will likely be possible in the next decade, if not sooner, and long before the 65-year term of the proposed NFL Concussion Litigation Settlement expires.

9. I am not aware of the use of the diagnostic or classification categories of "Neurocognitive Impairment Level 1.0," "Neurocognitive Impairment Level 1.5," or "Neurocognitive Impairment Level 2.0" anywhere in the medical or scientific community.

Pursuant to 28 U.S.C. § 1746, I state under penalty of perjury that the foregoing is true and correct.

Dated: November 25, 2014



Michael Weiner

Exhibit A

Curriculum Vitae - Michael W. Weiner, M.D.**CURRICULUM VITAE****MICHAEL W. WEINER, M.D.****MARRIED:** 1962, two children

Revised: November 25, 2014

EDUCATION:

The Johns Hopkins University, Baltimore, Maryland	B.A. 1961
SUNY Upstate Medical Center, Syracuse, New York	M.D. 1965
Intern & Assistant Resident in Medicine, Mt. Sinai Hospital, New York, New York	1965-1967
Clinical Fellow in Metabolism Yale-New Haven Medical Center, New Haven, Connecticut	1967-1968
Research Fellow (with Dr. Franklin H. Epstein) Yale University School of Medicine, New Haven, CT	1968-1970
University of Wisconsin, Institute for Enzyme Research, Madison, Wisconsin	1970-1972
Research Fellow (with Dr. Henry A. Lardy). Joint Appointment in Renal Section of the Department of Medicine (with Dr. Richard E. Rieselbach).	1970-1972

HONORS:

Honors in Organic Chemistry Research, The Johns Hopkins University	1961
Winner of an Honor Thesis Award SUNY Upstate Medical Center, Syracuse, NY	1965
Fellow of the National Kidney Foundation	1970-1972
Diplomate of the American Board of Internal Medicine in Internal Medicine and Nephrology	1972
Fellow of the American College of Physicians	1973

Curriculum Vitae - Michael W. Weiner, M.D.**HONORS (Continued):**

A. Blaine Brower Traveling Scholarship of the American College of Physicians (Laboratory of Sir Hans Krebs, Oxford, England)	1975
Young Investigator Award of the American College of Cardiology	1976
Mellon Fellowship for Stanford Junior Faculty Leave Program in the laboratories of Dr. Floyd C. Rector, Jr., U.C.S.F. and Dr. Frank Gotch	1978
Editor's Recognition Award with Special Distinction from Radiological Society of North America, Inc.	1993-1995
Fellow of the International Society for Magnetic Resonance in Medicine	2002
Middleton Award from the Department of Veterans Affairs	2006
Gold Medal of Paul Sabatier University, Toulouse, France	2010
Gold Medal of the City of Toulouse, France	2010
2010 Geoffrey Beene Foundation's Rock Stars of Science™, as seen in GQ Magazine's <i>Men of the Year</i> Edition	2010
Ronald and Nancy Reagan Research Award on behalf of the Alzheimer's Disease Neuroimaging Initiative	2011
2013 Potamkin Award from the American Academy of Neurology and the American Brain Foundation	2013

PROFESSIONAL EMPLOYMENT:

Research and Education Associate of the Veterans Administration	1971-1974
Assistant Professor of Medicine, University of Wisconsin, School of Medicine	1971-1974
Assistant Professor of Institute for Enzyme Research, University of Wisconsin	1972-1974
Chief Metabolism Service, V.A. Hospital, Madison, Wisconsin	1973-1974
Clinical Investigator of the Veterans Administration	1974-1977
Assistant Professor of Medicine, Stanford University, School of Medicine	1974-1980
Assistant Chief of Artificial Kidney Center,	1974-1980

Curriculum Vitae - Michael W. Weiner, M.D.

Palo Alto Veterans Administration Hospital, Palo Alto, CA

Associate Professor of Medicine in Residence, University of California, San Francisco	1980-1990
Chief, Hemodialysis Unit, San Francisco Veterans Administration Medical Center	1980-1983
Associate Professor of Radiology in Residence, University of California, San Francisco	1983-1990
Scientific Director, Magnetic Resonance Unit, San Francisco Veterans Administration Medical Center	1985-present
Associate Staff Member, Cardiovascular Research Institute Senior Staff Member	1988-1993 1994
Bioengineering Graduate Group University of California, Berkeley & San Francisco	1988
Graduate Group in Biophysics, University of California, Berkeley	1988
Member, Alzheimer's Center Executive Committee University of California, San Francisco	1994
Director, Center for Imaging of Neurodegenerative Diseases San Francisco Veterans Administration Medical Center	2004-2013
Professor of Medicine, Radiology, Psychiatry and Neurology University of California, San Francisco	1990-present

ACADEMIC ACTIVITIES:

NIH study sections, site visits, and ad hoc review concerning
magnetic resonance spectroscopy

Editorial Board - Magnetic Resonance in Medicine

Editorial Board - NMR in Biomedicine 1988-2003

Editorial Board - Magnetic Resonance Imaging

Editorial Board - Journal of Magnetic Resonance Imaging

Editorial Advisory Board - MR, The Quarterly Magazine of Magnetic Resonance

Curriculum Vitae - Michael W. Weiner, M.D.

Editorial Advisory Board – Journal of Neurochemistry

Review of manuscripts for many medical and scientific journals concerning magnetic resonance and nephrology

Co-organizer of Workshop on Techniques for *In vivo* NMR Spectroscopy.

April 1987, San Francisco; April 1989, San Francisco;
April 1990, San Francisco; April 1991, St. Louis, MO

Co-organizer, 1st International Symposium on Magnetic Resonance Spectroscopy, 1987
Tokyo, Japan

Magnetic Resonance Committee. American College of Radiology 1989-Present

Chairman, Committee on Magnetic Resonance Spectroscopy. 1989-1990
Society of Magnetic Resonance Imaging

Co-chairman, Symposium on Spectroscopy, 1990
Society of Magnetic Resonance Imaging

Chairman, Educational Symposium on Spectroscopy, 1990
Society of Magnetic Resonance in Medicine

Merit and Promotion Committee, 1995-1996
Department of Radiology, University of California, San Francisco

Chair of the Committee for Affiliated Sections-SMRT, 1997-1998
International Society for Magnetic Resonance in Medicine

Member, Faculty Development Committee, Department of Radiology, 1999- present
University of California, San Francisco

Scientific Advisory Board Member, Institute for the Study of Aging 2000

Co-organizer of the Alzheimer's Imaging Consortium, Washington, DC, July 2000

Chairman of the VA VISN Committee on Research 1995-present
(This important committee concerns research throughout the VA network,
which includes all of Northern California, Reno, and Hawaii.)

Member, Scientific Advisory Board, Institute for the Study of Aging 2000-present

Council Member of National Institute of BioEngineering and BioImaging 2003-2005

VA/Uniformed Services University of Health Sciences PTSD Brain Bank Committee, Sub-Task Force on Assessment 2003-present

Curriculum Vitae - Michael W. Weiner, M.D.

Scholarships and Awards Committee, UCSF School of Medicine	2003-present
Editorial Board Member, TMRI	2005-present
Guest Editor, TMRI	2005
Editorial Board Member, Alzheimer's & Dementia: The Journal of the Alzheimer's Association	2005-present
Advisor for the National Database for Autism Research	2006
Editorial Board Member, Brain Imaging and Behavior	2007
Board Member, The ALS Association	2007- present
Board Member, Alzheimer's Research for a Cure Foundation	2008-present
Member, NIH Center for Scientific Review	2010-present
Panel Member, Committee on Human Research, UCSF, Laurel Heights	2013-present

FUNDING:

Ongoing Research Support

W81XWH-12-MRPRA-MRFA Weiner (PI) 09/01/13-
08/31/16

Effects of traumatic brain injury and post traumatic stress disorder on Alzheimer's disease (AD) in Veterans with mild cognitive impairment using ADNI

The overall long-term goal of this project is to prevent Alzheimer's Disease. This study targets veterans who have suffered PTSD and TBI and show mild cognitive impairment to assess their risk for Alzheimer's Disease.

2U01AG024904 Weiner (PI) 09/30/10 – 08/31/15

Alzheimer's Disease Neuroimaging Initiative 2

The overall goal of this project is to determine the relationships among the clinical, cognitive, imaging, genetic and biochemical biomarker characteristics of the entire spectrum of Alzheimer's disease (AD), as the pathology evolves from normal aging through very mild symptoms, to mild cognitive impairment (MCI), to dementia.

W81XWH-12-2-0012 Weiner (PI) 02/21/12-02/20/15

DOD

Effects of Traumatic Brain Injury (TBI) and Post Traumatic Stress Disorder (PTSD)

Curriculum Vitae - Michael W. Weiner, M.D.

on Alzheimer's Disease (AD) in Veterans Using Imaging and Biomarkers in the AD Neuroimaging Initiative (ADNI). This study will provide novel data to test the hypothesis that Combat associated TBI and/or PTSD increase the risk for AD, and decrease cognitive reserve, determined with imaging/biomarkers, in Veteran subjects, after accounting for age and APOE genotype.

P01 AG19724 Miller (PI) 09/01/12 - 08/31/17
Frontotemporal Dementia: Genes, Images and Emotions: Project 2: "Imaging"
Weiner (PI)
The goals of this project are to determine the structural, perfusion, and chemical changes of the brain that 1) occur in frontotemporal lobar degeneration (FTLD) and progressive supranuclear palsy (PSP); 2) distinguish FTLD and PSP from Alzheimer's Disease (AD); and 3) accompany the cognitive and behavioral symptomatology of FTLD and PSP. Role: Co-Investigator

P50 AG023501 Miller (PI) 04/15/09 – 03/31/14
Novel Approaches to Dementia Heterogeneity: Core E: Imaging
The goal of this core is to identify structural, perfusion, and metabolic changes in the brain that predict future cognitive decline and conversion to dementia. Role: Co-Investigator

W81XWH-09-2-0044 Marmar (PI) 04/01/10 – 02/19/14
Biomarkers for PTSD
The goal is to determine MRI changes in brains of patients with post traumatic stress disorder and correlations with cognitive impairments and symptoms. Role: PI of subcontract

W81XWH-10-1-0021 Wolkowitz (PI) 01/01/10-
12/31/13
Allostatic Load, Genetics and Neurobiology in PTSD: Identifying Novel Biomarkers
of Combat-Related PTSD
One overall goal of the Neuroimaging Core is first to achieve homogeneous
acquisition of structural as well as perfusion and diffusion tensor images at high field
at the James J. Peters VA Medical Center (JJPVAMC) in a fashion that harmonizes
with the project ongoing in San Francisco.

Curriculum Vitae - Michael W. Weiner, M.D.

P01 AG012435 Chui (PI) 09/01/08 - 05/31/14
Aging Brain -- Vasculature, Ischemia, and Behavior: Subproject:
Neuroimaging Core C;
1H and 31P MRSI of SIVD - Project 2

This project addresses four major areas of inquiry in subcortical ischemic vascular dementia (SIVD): the role of ongoing ischemia; the role of infarction in neuron loss; the role of disconnection of subcortical and cortical structures in SIVD; and the relative differences in subcortical and cortical changes between SIVD and Alzheimer's Disease. Role: Consortium PI

R01 AG032306 Rosen (PI) 09/30/09 – 08/31/14
The Frontotemporal Lobar Degeneration Neuroimaging Initiative Core: Imaging
The overall goal of this subcontract is to determine the patterns of structural and functional brain changes over time in patients with Frontotemporal Lobar Degeneration (FTLD). The study will provide estimates of rates of progression of the disease, which could have a huge diagnostic value, and for power calculations in clinical trials.

ADNI 2-12-233036 Weiner/Mueller 07/01/12-06/30/15
Alzheimer's Association
ADNI 2 add on project: Hippocampal Subfield Volumetry
This study will expand the scope of the Alzheimer's Disease Neuroimaging Initiative (ADNI) by performing hippocampal subfield volumetry on existing ANDI data sets and transferring data to the LONI database for further analysis.

20110506 Brzezinski (PI) 10/1/11-5/31/14
Alzheimer's Drug Discovery Foundation
Effects of Brain Beta Amyloid on Postoperative Cognition
Purpose: To test the hypothesis that preoperative presence of brain beta-amyloid plaques in non-demented subjects increases postoperative cognitive decline in elderly subjects scheduled for hip or knee replacement.

Completed Research Support

R01 NS31966 Laxer (PI) 07/01/05–06/30/12
NIH/NINDS
High Field Neuroimaging in Epilepsy

Curriculum Vitae - Michael W. Weiner, M.D.

The overall goals of this subcontract is to evaluate the role of high field MR/MRSI studies for non invasive focus localization and detection of extrafocal abnormalities contributing to cognitive impairment in patients suffering from partial epilepsy.

Role: Co-investigator

U01 AG024904 Weiner (PI) 09/30/04 – 09/29/10

Alzheimer's Disease Neuroimaging Initiative

The goals are to 1) Develop improved methods, which will lead to uniform standards for acquiring longitudinal, multi-site MRI and PET data on patients with Alzheimer's disease (AD), mild cognitive impairment (MCI), and elderly controls; 2) Acquire a generally accessible data repository, which describes longitudinal changes in brain structure and metabolism. In parallel, acquire clinical, cognitive and biomarker data for validation of imaging surrogates; 3) Determine those methods which provide maximum power to determine treatment effects in trials involving these patient groups. Role: PI

DAMD17-03-1-0532 Weiner (PI) 09/30/03-01/31/11

Department of Defense: 4 Tesla MRI for Neurodegenerative Diseases

The goals of this project are to determine the anatomic (i.e. spatial) patterns of structural, perfusion, and metabolic changes in these conditions. 2) develop improved diagnostic methods which can be applied to clinical practice 3) develop methods for monitoring disease progression which can be used in treatment trials, and 4) detect the presence of neurodegenerative diseases at an early, preclinical stage so that preventative treatment can be effectively initiated. Role: PI

Michael J. Fox Foundation Weiner (PI) 11/01/09-02/28/11

Promoting Widespread Data Sharing Among Scientists

The objective of this study is to develop the details of a 3-year project that will spearhead a movement to make data sharing the norm among scientists. This project will survey the various scientific communities – physical, biological, behavioral – to determine the benefits, the feasibility and obstacles of data sharing.

Amyloid Imaging, VMCI, and Analysis for ADNI

The goal of this project is to determine the clinical, cognitive, imaging, genetic, and biochemical biomarker characteristics of the early stages of Alzheimer's disease.

Role: PI

DAMD17-01-1-0764 Weiner (PI) 08/01/01 – 03/31/13

Department of Defense: Magnetic Resonance and Spectroscopy of the Human Brain in Gulf War Illness

The goal is to test the hypothesis that subjects with Gulf War Illness have metabolic and or morphological changes in their brain, which are not accounted for by confounds such as PTSD, alcoholism and depression. Role: PI

Curriculum Vitae - Michael W. Weiner, M.D.

Predicting amyloid positivity in subjects with mild Alzheimer's disease from an automated MRI classifier. The overall goal of this proposal is to develop a structural MR imaging signature predictive of global brain amyloidosis in mild AD subjects. The MRI-based amyloid signature will be used to distinguish amyloid+ mild AD subjects from amyloid- mild AD subjects recruited in Solanezumab trial.

W81XWH-09-2-0044 Marmar (PI) 09/23/11 – 10/22/13

Biomarkers for PTSD in Female Iraq and Afghanistan Veterans (supplement)
The goal is to determine MRI changes in brains of female patients with post
traumatic stress disorder and correlations with cognitive impairments and
symptoms.

PUBLIC SERVICE:

Demonstrated Magnetic Resonance Unit to Colin Powell 1995

Demonstrated Magnetic Resonance Unit to Dr. George Rutherford, Chairman, Department of Veterans Affairs Realignment Advisory Committee

Dr. Weiner's band, "Giant Steps," played at the DVA Medical Center Christmas Party. 1996

Dr. Weiner's band played at the Nurse Week Ceremony 2006

Several appearances made, and lectures given for the Alzheimer's Association 2005-present

Briefed the Congressional Task force on Alzheimer's Disease at the U.S. Capitol 2007

Served on planning committee for the Department of Veterans Affairs Office of Research and Development State of the Art (SOTA) conference entitled: "Research to Improve the Lives of Veterans: Approaches to Traumatic Brain Injury Screening, Treatment, Management, and Rehabilitation." 2007

SOCIETIES:

Sigma Xi 1971

American Federation of Clinical Research 1971

Curriculum Vitae - Michael W. Weiner, M.D.

American Society of Nephrology	1971
International Society of Nephrology	1972
Mid-West Salt and Water Club	1972
American Heart Association Council on the Kidney in Cardiovascular Disease	1973
American Diabetes Association	1973
American Society of Artificial Internal Organs	1974
Biophysical Society	1975
American Association of University Professors	1975
The American Physiological Society	1975
American Society of Biological Chemists	1976
American Society for Pharmacology and Experimental Therapeutics	1977
Society for Experimental Biology and Medicine	1977
Western Society for Clinical Investigation	1978
International Society for Artificial Organs	1978
International Society of Magnetic Resonance	1983
Society of Magnetic Resonance in Medicine	1983
Bay Area Animal Resonance Club (Founder)	1984
Society of Magnetic Resonance Imaging	1985
American Association for the Advancement of Science	1985
Radiological Society of North America	1985
The New York Academy of Sciences	1987
Western Association of Physicians	1989
The International Society of CNS Clinical Trials and Methodology	2005
Alzheimer's Association International Society to Advance Alzheimer's Research and Treatment (ISTAART)	2009

Curriculum Vitae - Michael W. Weiner, M.D.**BIBLIOGRAPHY****THESIS, PATENT, AND BOOK CHAPTERS:**

1. Weiner, M.W. A study of the effects of feeding a gallstone inducing diet on the concentrating ability of the mouse gall bladder in vitro. (Medical School Thesis).
2. Hayslett, J.P., Kashgarian, M.I., Weiner, M.W., Epstein, F.H. Effects of changes of extracellular fluid on sodium reabsorption in the proximal and distal tubule. Chapter in Regulation of Body Fluid Volumes by the Kidney. pp.263-269, Eds: Cort, J.H., Lichardas, B., Karger, S. Basel, New York, 1970.
3. Weiner, M.W., Epstein, F.H. Signs and symptoms of electrolyte disorders. Chapter 16 in Clinical Disorders of Fluid and Electrolyte metabolism, 2nd Edition. Eds: Maxwell, M.H., Kleeman, C.R. McGraw-Hill, Inc., New York, 1972.
4. Weiner, M.W., Maffly, R.H. The provision of cellular metabolic energy for active ion transport. Chapter 16 in Physiological of Membrane Disorders. pp.287-314. Eds: Andreoli, T., Hoffman, J., Fanestil, D., Plenum Publishing Corporation, New York, 1978.
5. Weiner, M.W. Special properties of kidney mitochondria. Chapter 2 in Biochemical Aspects of Kidney Function. p. 113, Eds: Ross, B.D., Guder, W.G., Pergamon Press, Oxford, 1980.
6. Weiner, M.W. Use of uncoupling agents to investigate the regulation of active transport. Chapter 4 in Biochemical Aspects of Kidney Function. pp. 257-262. Eds: Ross, B.D., Guder, W.G. Pergamon Press, Oxford, 1980.
7. Koretsky, A.P., Strauss, W., Basus, V., Murphy, J., Bendel, P., James, T., Weiner, M.W. Feasibility of 31P NMR to study metabolic effects of renal ischemia in vivo. Chapter 9 in Acute Renal Failure. pp. 42-46. Eds: Eliahu, H.E., Libby, J. 1982.
8. Patent # 4,292,227 awarded on September 29, 1981 to Michaels, A.S., Weiner, M., Jalan, H. Stable supersaturated solutions of sparingly soluble salts.
9. Koretsky, A.P., Weiner, M.W. 31Phosphorous magnetization transfer measurement of exchange reactions in vivo. Chapter 14 in Biomedical Magnetic Resonance. pp. 231-242. Eds: James, T.L., Margulis, A. Radiol. Res. Ed. Foundation, San Francisco, 1984.
10. Adam, W., Weiner, M.W. Measurement of intracellular pH by 31P NMR: Relationship of pH to ammonogenesis. Chapter in Contributions to Nephrology, Vol. 47, No. 3., Renal Ammonia Metabolism. Eds: Tannen, R.L., Schoolwerth, A.C., Kurokawa, K., Vinay, P. S. Karger, Basel, 1985.
11. Weiner, M.W. Magnetic Resonance Imaging and Spectroscopy of the Kidney. Chapter in Current Nephrology, Vol. 9. Eds: Gonick, H. Year Book Medical Publications, Chicago, 1985.

Curriculum Vitae - Michael W. Weiner, M.D.

12. Matson, G.B., Weiner, M.W. MR spectroscopy in vivo: Principles, animal studies, and clinical applications. Chapter 11 in Magnetic Resonance Imaging. Eds: Bradley, W., Stark, D., Mosby, C.V. St. Louis, 1988.
13. Matson, G.B., Weiner, M.W. Techniques and Application of in vivo Magnetic Resonance Spectroscopy. Proceedings of The San Francisco Workshop on Magnetic Resonance Spectroscopy In vivo. April 4-5, 1987.

Chapters co-authored by M.W. Weiner:

Roth, K., Hubesch, B., Naruse, S., Gober, J., Lawry, T.J., Matson, G.B., Weiner, M.W. Quantitation of Metabolites in the Human Brain.

Matson, G.B., Twieg, D.B., Karczmar, G.S., Lawry, T.J., Gober, J., Valenzia, M., Boska, M.D., Weiner, M.W. Surface Coil 31P ISIS Experiments Applied to the Human Organs of Liver, Heart, and Transplanted Kidney.

Lawry, T.J., Matson, G.B., Weiner, M.W. Optimization of Two Coil Depth Pulse Experiments.

Karczmar, G.S., Lawry, T.J., Weiner, M.W., Matson, G.B. Computer Simulations of Tailored Excitation in the Rotating Frame.

Boska, M.D., Matson, G.B., Weiner, M.W. Evaluation and Comparison of RF Coil Decoupling Schemes.

Matson, G.B., Lawry, T.J., Weiner, M.W. Optimization of Surface Coil Size through Computer Modeling.

Roth, K., Weiner, M.W. Computer Simulations of Reactions Involving High-Energy Phosphates.

14. Weiner, M.W. Clinical applications of magnetic resonance spectroscopy and spectroscopic imaging. Chapter in Diagnostic Radiology. pp. 137-146. Eds: Margulis, A.R., Gooding, C.A. Radiology Research Education Foundation, San Francisco, 1988.
15. Karczmar, G.S., Weiner, M.W. Investigation of metabolic disorders in patients and animal models using in vivo nuclear magnetic resonance spectroscopy. Chapter in Cell Function and Disease. Eds: Todd, L.E., Cañedo, L.E. Plenum Press, 1988.
16. Meyerhoff, D.J., Weiner, M.W. Magnetic resonance spectroscopy. Chapter in Alimentary Tract Radiology, 4th Edition, Vol. 2. Ed: Margulis, A. The C.V. Mosby Co., St. Louis, 1988.
17. Weiner, M., Schaefer, S., Meyerhoff, D., Hubesch, B., Karczmar, G, Boska, M., Twieg, D., Matson, G. Clinical Uses of Magnetic Resonance Spectroscopy. Chapter in Diagnostic Radiology. Eds: Gooding, C., Margulis, A. Radiology Research and Education Foundation, San Francisco, 1989.

Curriculum Vitae - Michael W. Weiner, M.D.

18. Schaefer, S., Massie, B., Weiner, M. Magnetic Resonance Spectroscopy of the Heart. Chapter in Cardiology Clinics. Eds: Wolfe, C., Saunders, W.B. 1988.
19. Schaefer, S., Weiner, M.W., and Massie, B. Clinical applications of cardiac spectroscopy. Chapter 19 in Cardiac Imaging - A Companion to Braunwald's Heart Disease. pp. 967-976. Eds: Marcus, M.L., Schelbert, H., Skorton, D., Wolf, G.L. W.B. Saunders Co., 1991.
20. Weiner, M.W. Clinical potential of magnetic resonance spectroscopy and spectroscopic imaging. Chapter in Diagnostic Radiology. pp. 515-524. Ed: Gooding, C.A. Radiology Research and Education Foundation, University of California, San Francisco, 1989.
21. Weiner, M.W., Baker, A., Carson, P., Schaefer, S., Schwartz, G., DeGroot, M., Massie, B., Miller, R.G. ³¹P MRS studies of skeletal muscle and heart: evidence of metabolic regulation by inorganic phosphate. Chapter 8 in Noninvasive Techniques in Biology and Medicine. pp.111-124. Eds: Freeman, S.E., Fukushima, I., Greene, E.R. San Francisco Press, Inc., San Francisco, 1990.
22. Karczmar, G.S., Meyerhoff, D.J., Hubesch, B., Boska, M.D., Valone, F., Twieg, D.B., Wilkinson, M., Matson, G.B., Weiner, M.W. Preliminary ³¹P MR studies of human tumors. Chapter in Magnetic Resonance in Experimental and Clinical Oncology. pp. 271 – 292. Eds: Evelhoch, J.L., Negendank, W., Valeriote, F.A., Baker, L.H. Kluwer Academic Publications, Boston, 1990.
23. Meyerhoff, D.J., Weiner, M.W. Magnetic resonance spectroscopy of the liver: A review. Chapter X in Liver Imaging - Present and Future Trends in MRI, CT, and Ultrasound. p. 289. Eds: Stark, D., Ferucci, J. Andover Medical Publishers, Boston, 1990.
24. Weiner, M.W. Forward In NMR for Physicians and Biologists. Eds: Hausser, K.H., Kalbitzer, H.R. Springer-Verlag, 1991.
25. Schwartz, G.G., Weiner, M.W. Magnetic resonance spectroscopy: Basic principles and potential applications in the study of the cardiovascular system. Chapter in Cardiovascular Magnetic Resonance Spectroscopy. Eds: Schaefer, S., Balaban, R. Kluwer Academic Publications, 1991.
26. Figueredo, V.M., Weiner, M.W. Magnetic resonance of the heart. Chapter in Clinical Applications of Magnetic Resonance Spectroscopy. Ed: Narusa, S. Igaku-Shoin LTD, Tokyo, 1991.
27. Meyerhoff, D.J., Weiner, M.W. Clinical application of magnetic resonance spectroscopy to renal disease. Chapter in Clinical Applications of Magnetic Resonance Spectroscopy. Ed: Narusa, S. Igaku-Shoin LTD, Tokyo, 1991.
28. Deicken, R.F., Calabrese, G., Meyerhoff, D.J., Sappey-Marinier, D., Fein, G., Weiner, M.W. Magnetic resonance spectroscopy of the human brain in neuropsychiatric disorders. Chapter in

Curriculum Vitae - Michael W. Weiner, M.D.

Biological Psychiatry. Eds: Racagni, G., Brunello, N., Fukuda, T. Excerpta Medica, New York, 1991.

29. Meyerhoff, D.J., Mackay, S., Baker, A.J., Schaefer, S., and Weiner, M.W. Magnetic Resonance Spectroscopy. Chapter in Magnetic Resonance Imaging of the Body, Second Edition. Eds: Higgins, C.B., Hricak, H., Helms, C.A. Raven Press, New York, 1992.
30. Meyerhoff, D.J., Weiner, M.W. Clinical ^{31}P magnetic resonance spectroscopy of cancers. In Proceedings ART91, International Symposium of the V. Vaillant Foundation: Tumor Response Monitoring and Treatment Planning.
31. Matson, G.B., Weiner, M.W. Spectroscopy. Chapter 15 in Magnetic Resonance Imaging. Eds: Stark, D.D., Bradley Jr., W.G. Mosby-Year Book, St. Louis, 1992.
32. Meyerhoff, D.J., Hetherington, H.P., Hugg, J.W., Matson, G.B., Fein, G., Maudsley, A.A., Weiner, M.W. Magnetic resonance spectroscopy and spectroscopic imaging of human liver, heart, kidney, and brain. Chapter in Imaging in alcohol Research. pp.177-193 Eds: Zakhari, S., Witt, E. U.S. Department of Health and Human Services, Rockville, MD, 1992.
33. Weiner, M.W. Clinical Spectroscopy. Chapter in Clinical MR Refresher Course, Basic Magnetic Resonance Spectroscopy, Advanced Magnetic Resonance Spectroscopy. pp. 47-55. Society of Magnetic Resonance in Medicine, Twelfth Annual Scientific Meeting, New York, 1993.
34. Hugg, J.W., Laxer, K.D., Weiner, M.W. Focal epilepsy localization by magnetic resonance spectroscopic imaging. Chapter in Advances in Clinical Neuroscience, Vol. 3. pp. 011-026. Ed: Sinha, K.K., 1993.
35. Kent-Braun, J.A., Miller, R.G., Weiner, M.W. Magnetic resonance spectroscopy studies of human muscle. Chapter in Radiology Clinic of North America, Vol. 32, No. 2. pp. 313-335 Ed: Sartoris, D.J., Saunders, W.B. Company, 1994.
36. Fein, G., Meyerhoff, D.J., Scianfani, V.D., Ezekiel, F., Poole, N., MacKay, S., Dillon, W.P., Constans, J-M., Weiner, M.W. ^1H MRSI separates neuronal from glial changes in alcohol-related brain atrophy. Chapter in Alcohol and Glial Cells, Vol. 12. pp. 227-241. Ed: Lancaster, F. NIAAA, 1994.
37. Fein, G., Meyerhoff, D.J., Di Sclafani, V., Ezekiel, F., Poole, N., MacKay, S., Dillon, W.P., Constans, J.M., Weiner, M.W. ^1H magnetic resonance spectroscopic imaging separates neuronal from glial changes in alcohol-related brain atrophy. Chapter in NIAAA Research Monograph - 27, Alcohol and Glial Cells. Ed: Lancaster, F.E. 1994.
38. Laxer, K.D., Hugg, J.W., Matson, G.B., and Weiner, M.W.: Application of Spectroscopy to Epilepsy. Chapter in Magnetic Resonance Scanning and Epilepsy. pp. 199-201. Ed: Shorvon, S.D., et al. Plenum Press, New York, 1994.

Curriculum Vitae - Michael W. Weiner, M.D.

39. Kent-Braun, J.A., Miller, R.G., Weiner, M.W. Human skeletal muscle metabolism in health and disease: Utility of magnetic resonance spectroscopy. Chapter 10 in Exercise and Sport Sciences Reviews. pp. 305-347. Ed: Holloszy, J.O. Williams and Wilkins, 1995.
39. Figueredo, V.M., Weiner, M.W. MRS of the heart. Chapter in Clinical Applications of Magnetic Resonance Spectroscopy. Ed: Naruse, S. Igaku-Shoin Ltd., Tokyo, Japan, 1995.
40. Meyerhoff, D.J., Weiner, M.W. Clinical application of MRS to renal disease. Chapter in Clinical Applications of Magnetic Resonance Spectroscopy. Ed: Naruse, S. Igaku-Shoin Ltd., Tokyo, Japan, 1995.
41. Miller, R.G., Kent-Braun, J.A., Sharma, K.R., Weiner, M.W. Mechanisms of human muscle fatigue: quantitating the contribution of metabolic factors and activation impairment. pp.195-210. Ed: Gandevia, S.C. Fatigue, Plenum Press, 1995.
42. Miller, R.G., Kent-Braun, J.A., Weiner, M.W. Techniques for quantifying central and peripheral factors in fatigue. Chapter in Recent Advances in Clinical Neurophysiology. Eds: Kimura, J., Shibasaki, H. Elsevier, Tokyo, Japan, 1996.
43. Weiner, M.W. Kidney, prostate, testicle, and uterus MRS of humans. Chapter in Encyclopedia of NMR. Eds: Grant, D.M., Harris, R.K. John Wiley & Sons, Ltd., 1996.
44. Meyerhoff, D.J., Kent-Braun, J.A., Greyson, C., Weiner, M.W. Clinical applications of magnetic resonance spectroscopy and spectroscopic imaging. Chapter in Magnetic Resonance Imaging of the Body, Third Edition. Eds: Higgins, C.B., Hricak, H., Helms, C.A. Lippincott Raven Press, New York, 1997.
45. Weiner, M.W. Magnetic resonance spectroscopy of cardiac and skeletal muscle. Chapter in ISMRM Educational Course Syllabus. pp.298-320. International Society for Magnetic Resonance in Medicine, Fifth Scientific Meeting, Vancouver, Canada, 1997.
46. Weiner, M.W. Magnetic resonance spectroscopy of brain in neurodegenerative disease. Chapter in ISMRM Educational Course Syllabus. pp.337-369. International Society for Magnetic Resonance in Medicine, Fifth Scientific Meeting, Vancouver, Canada, 1997.
47. Weiner, M.W. Magnetic resonance imaging (MRI) and magnetic resonance spectroscopy (MRS) of Alzheimer's disease. Chapter in Alzheimer's Disease II. pp.121-125. Eds: Friedman, E., Savage, L. IBC Library Series, Southborough, MA, 1997.
48. Matson, G.B., Govindaraju, V., Kiefer, A.P., Schuff, N., Weiner, M.W., Maudsley, A.A. Multiple-echo proton spectroscopic imaging of human brain. Chapter in High-Power Gradient MR-Imaging: Advances in MRI II. pp.239-244. Eds: Oudkerk, M., Edelman, R.R. Blackwell Wissenschaft, Berlin, 1997.
49. Vermathen, P., Laxer, K.D., El Din, M., Matson, G.B., Weiner, M.W. ¹H MRSI of the hippocampus in epilepsy patients and in controls. Chapter in High-Power Gradient MR-

Curriculum Vitae - Michael W. Weiner, M.D.

- Imaging: Advances in MRI II. pp.249-252. Eds: Oudkerk, M., Edelman, R.R. Blackwell Wissenschaft, Berlin, 1997.
50. Weiner, M.W.: Magnetic Resonance Spectroscopy (MRS) and Magnetic Resonance Spectroscopic Imaging (MRSI): Technical Developments and Clinical Applications. Chapter in High-Power Gradient MR-Imaging: Advances in MRI II. Editors: M. Oudkerk, R.R. Edelman, Blackwell Wissenschaft, Berlin, pp.199-202, 1997.
51. Meyerhoff, D.J., Fein, G., Weiner, M.W. Cerebral metabolic effects of HIV infection studied by ^1H MR spectroscopic imaging. Chapter in High-Power Gradient MR-Imaging: Advances in MRI II. pp.245-248. Eds: Oudkerk, M., Edelman, R.R. Blackwell Wissenschaft, Berlin, 1997.
52. Schwartz, G.G., Greyson, C.R., Massie, B.M., Weiner, M.W., Wisneski, J.A. Energy metabolism of the right ventricle. Chapter in Current and Future Applications of Magnetic Resonance in Cardiovascular Disease. pp. 475-491. Eds: Higgins, C.B., Ugurbil, K. American Heart Association/Futura Medical Publishers, Armond, NY, 1998.
53. Schuff, N., Sapye Marinier, D., Weiner, M.W. Magnetic Resonance Spectroscopy in Dementia. Chapter in Neuroimaging of Normal Aging in and Uncommon Causes of Dementia; Current Issues in Neurodegenerative Diseases, Vol. 7, pp.225-244. Eds: Fazekas, Schmidt, Alavi. ICG Publications, The Netherlands, 1998.
54. Sapye Marinier, D., Schuff, N., Weiner, M.W. Magnetic Resonance Spectroscopy of Normal Brain in Maturation and Aging. Chapter in Neuroimaging of Normal Aging in and Uncommon Causes of Dementia; Current Issues in Neurodegenerative Diseases, Vol. 7. Eds: Fazekas, Schmidt, Alavi. ICG Publications, The Netherlands, 1998.
55. Matson, G.B., Weiner, M.W. Spectroscopy. Chapter in Magnetic Resonance Imaging, Third Edition. pp.181-214. Eds: Stark, D.D., Bradley, Jr., W.G. Mosby-Year Book, St. Louis, 1998.
56. Weiner, M.W., Maudsley, A.A., Schuff, N., Soher, B.J., Vermathen, P., Fein, G., Laxer, K. Multislice ^1H Magnetic Resonance Spectroscopic Imaging: Assessment of Epilepsy, Alzheimer's Disease, and Amyotrophic Lateral Sclerosis. International Society for Optical Engineering. Chapter in Medical Imaging 1998: Physiology and Function from Multidimensional Images. Vol. 3337. pp. 203-209. Ed: Hoffman, E.A. SPIE, San Diego, 1998.
57. Schuff, N., Vermathen, P., Maudsley, A.A., Weiner, M.W. Proton Magnetic Resonance Spectroscopic Imaging in Neurodegenerative Diseases, Chapter in Current Science, Vol. 6. pp. 800-807, 1998, and Vol XX. Indian Academy of Sciences Publication, 1999.
58. Weiner, M.W. Kidney, Prostate, Testicle and Uterus of Subjects studied by MRS. Chapter in Methods in Biomedical Magnetic Resonance Imaging and Spectroscopy. Ed: Young, I. Wiley, 2000.
59. Schuff, N., Du, A.T., Amend, D., Hsu, Y.Y., Laakso, M.P., Jagust, W., Chui, H.C., Weiner, M.W. MRI of Entorhinal Cortex and Hippocampus in Alzheimer's Disease, Subcortical

Curriculum Vitae - Michael W. Weiner, M.D.

Ischemic Vascular Dementia and Mixed Dementia. Chapter in Alzheimer's Disease: Advances in Etiology, Pathogenesis, and Therapeutics. pp. 229-236. Eds: Iqbal, K., Sisodia, S.S., Winblad, B. John Wiley & Sons, Ltd., London, 2001.

60. Chui, H., Fein, G., Mungas, D., Jagust, W., Weiner, M., Vinters, H. Neuroimaging and Pathological Correlates of Dementia Associated with Subcortical Ischemic Vascular Disease (SIVD). Chapter in Contemporary Neuropsychiatry. pp. 147-151. Eds: Miyoshi, K., Shapiro, C.M., Gaviria, M., Morita, Y. Springer-Verlag, Hong Kong, Tokyo, 2001.
61. "NAA, Canavan's disease and NAAG: The First International Symposium on N-Acetylaspartate". The publisher is Kluwer (now apparently bought by Springer). The series is "Advances in Experimental Medicine and Biology". (in press 2006).
62. Tosun, D., Schuff, N., Shaw, L.M., Trojanowski, J.Q., Weiner, M.W., and the Alzheimer's Disease NeuroImaging Initiative. Relationship between CSF Biomarkers of Alzheimer's Disease and Rates of Regional Cortical Thinning in ADNI Data. Chapter in Advances in Alzheimer's Disease 2; Handbook of Imaging the Alzheimer Brain. pp. 127-140. Eds: Ashford, J.W., Rosen, A., Adamson, M., Bayley, P., Sabri, O., Furst, A., Black, S.E., Weiner, M. IOS Press, The Netherlands, 2011.

Curriculum Vitae - Michael W. Weiner, M.D.**JOURNAL PUBLICATIONS:**

1. Tepperman, J., Weiner, M.W. Experimental gallstones: An adventure in biological geology. *Yale J. Biol. Med.*, 41:107-119, 1968. PMID: 5707273
2. Weiner, M.W., Epstein, F.H. Signs and symptoms of electrolyte disorders. *Yale J. Biol. Med.*, 43:76-104, 1970. PMID: 4923380
3. Weiner, M.W., Weinman, E.J., Kashgarian, M., Hayslett, J.P. Accelerated reabsorption in the proximal tubule produced by volume depletion. *J. Clin. Invest.*, 50:1379-1385, 1971. PMC292075
4. Weiner, M.W., Torretti, J., Sauer, L.A., Epstein, F.H. Renal mitochondrial enzymes in potassium depletion. *Amer. J. Physiol.*, 221:613-617, 1971. PMID: 4327074
5. Cunarro, J.A., Weiner, M.W. Quantitative correlation between the proton carrying and respiratory-stimulating properties of uncoupling agents using rat liver mitochondria. *Nature*, 245:36-37, 1973. PMID: 4583125
6. Weiner, M.W., Lardy, H.A. Reduction of pyridine nucleotides by adenosinediphosphate in kidney mitochondria: Effects of sodium, magnesium and inhibitors of oxidative phosphorylation. *J. Biol. Chem.*, 248:7682-7687, 1973. PMID: 4147982
7. Manuel, M.A., Beirne, G.J., Wagnild, J.P., Weiner, M.W. An effect of spironolactone on urinary acidification in normal man. *Arch. Intern. Med.*, 134:472-474, 1974. PMID: 4850527
8. Cunarro, J., Weiner, M.W. Comparison of four methods for measuring urinary ammonia. *Kidney International*, 5:303-305, 1974. PMID: 4850179
9. Weiner, M.W., Lardy, H.A.: Effects of respiratory chain inhibitors on mitochondrial ATPase activity. *Arch. Biochem. Biophys.*, 162:568-577, 1974. PMID: 4276120
10. Cunarro, J.A., Johnson, W.A., Uehling, D.T., Updike, S.J., Weiner, M.W. Effects of low temperature preservation on metabolite levels of dog renal cortex. *Proceedings of the Clinical Dialysis and Transplant Forum* IV:196-200, 1974. PMID: 4619663
11. Weiner, M.W. Mitochondrial permeability to chloride ion. *Amer. J. Physiol.*, 228:122-126, 1975. PMID: 238400
12. Weiner, M.W. ATPase activity of kidney mitochondria stimulated by sodium. *Amer. J. Physiol.*, 228:815-820, 1975. PMID: 234691
13. Cunarro, J.A., Weiner, M.W. Mechanism of action of agents which uncouple oxidative phosphorylation: Direct correlation between proton carrying and respiratory-releasing properties using rat liver mitochondria. *Biochem. Biophys. Acta*, 387:234-240, 1975. PMID: 1125290

Curriculum Vitae - Michael W. Weiner, M.D.

14. Wingert, K.J., Weiner, M.W. Acetate dislysance by the Dow-4 and Gambro 13.5 artificial kidneys. Proceedings of the Clinical Dialysis and Transplant Forum V:122-127, 1975. PMID: 1232624
15. Manuel, M.A., Weiner, M.W. Effects of ethacrynic acid and furosemide on isolated rat kidney mitochondria: Inhibition of electron transport in the region of phosphorylation site II. J. Pharmacol. Exp. Ther., 198:209-221, 1976. PMID: 180279
16. Cunarro, J.A., Johnson, M.A., Uehling, D.T., Updike, S.J., Weiner, M.W. Metabolic consequences of low temperature kidney preservation. J. Lab. Clin. Med., 88:873-884, 1976. PMID: 792369
17. Richards, R.H., Dowling, J.A., Vreman, H.J., Feldman, C.A., Weiner, M.W. Acetate levels in human plasma. Proceedings of the Clinical Dialysis and Transplant Forum V1:73-79, 1976. PMID: 1029892
18. Manuel, M.A., Weiner, M.W. Effects of ethacrynic acid and furosemide on phosphorylation reactions of kidney mitochondria: Inhibition of the adenine nucleotide translocase. Biochem. Biophys. Acta., 460:445-454, 1977. PMID: 141937
19. Soboslai, G., McTigue, M., Weiner, M.W. Mechanism of active chloride transport by the urinary bladder of the Colombian toad. Amer. J. Physiol., 233:F421-F427, 1977. PMID: 21569
20. Diamond, A., Weiner, M.W. Renal hydrogen ion secretion and excretion during acute acid loading. Mount Sinai Journal of medicine, 45:342-356, 1978. PMID: 27719
21. Weiner, M.W. Effects of halothane on mitochondrial ion permeability. Pharmcol. Res. Comm., 10:31-42, 1978. PMID: 643890
22. Cunarro, J.A., Weiner, M.W. Effects of ethacrynic acid and furosemide on respiration of isolated kidney tubules: The role of ion transport and the source of metabolic energy. J. Pharmacol. Exp. Ther., 206:198-206, 1978. PMID: 660550
23. Weiner, M.W. Effects of chloride, nitrate and sulfate on ATPase of renal cortex and medulla. Proc. Soc. Exper. Biol. Med., 158:370-372, 1978. PMID: 150603
24. Vreman, J.H., Dowling, J.A. Raubach, R.A., Weiner, M.W. Determination of acetate in biological material by vacuum microdistillation and gas chromatography. Anal. Chem., 50:1138-1141, 1978. PMID: 677464
25. Crawford, D.R., Reyna, R.S., Weiner, M.W. Effects of *in vivo* and *in vitro* dialysis on plasma transaminase activity. Nephron, 22:418-422, 1978. PMID: 740106

Curriculum Vitae - Michael W. Weiner, M.D.

26. Johnson, W.A., Weiner, M.W. Protective effects of ketogenic diets on signs of hypoglycemia. *Diabetes*, 27:1087-1091, 1978. PMID: 720768
27. Weiner, M.W. Uncoupling agents distinguish between the effects of metabolic inhibitors and transport inhibitors. *Science*, 204:187-188, 1979. PMID: 107585
28. Assomull, V., Vreman, H., and Weiner, M.W. Mass balance of base equivalents during hemodialysis: Importance of organic acid ions. *Proceedings of the Clinical Dialysis and Transplant Forum*, 8:137-141, 1978. PMID: 40220
29. Wingert, K.J., Weiner, M.W. Acetate transfer across membranes of artificial kidneys in vitro. *Kidney International*, 15:593-600, 1979. PMID: 459243
30. Tollinger, C.D., Vreman, H.J., Weiner, M.W. Measurement of acetate in human blood by gas chromatography: Effects of sample preparation, feeding and various diseases. *Clinical Chemistry*, 25:1787-1790, 1979. PMID: 476928
31. Urion, D., Vreman, H.J., Weiner, M.W. Effects of acetate on hypoglycemic seizures in mice. *Diabetes*, 28:1022-1026, 1979. PMID: 488541
32. Assomull, V.M., Vreman, J.H., Weiner, M.W. Evidence that acetate in dialysis does not stimulate lipid synthesis. *Proceedings of the Clinical Dialysis and Transplant Forum* 9:73-79, 1979. PMID: 552058
33. Kaiser, B.A., Assomull, V.M., Vreman, H.J., Weiner, M.W. Dialysance of acetate and bicarbonate: Effect of ultrafiltration. *Proceedings of the Clinical Dialysis and Transplant Forum* 9:104-107, 1979. PMID: 552031
34. Vreman, H.J., Thorning, D., Weiner, M.W. Effects of dietary acetate and bicarbonate on experimental atherosclerosis in rabbits. *Atherosclerosis*, 35(2):145-53, 1980. PMID: 7352953
35. Weiner, M.W. The use of an uncoupling agent to investigate the regulation of active sodium transport. *Int. J. Biochem.*, 12:257-261, 1980.
36. Weiner, M.W. Special properties of kidney mitochondria. *Int. J. Biochem.*, 12:113-117, 1980. PMID: 7399031
37. Weiner, M.W. The effects of bicarbonate and hydroxyl ions on chloride transport by toad bladders. *Biochem. Biophys. Acta.*, 596:292-301, 1980. PMID: 6766741
38. Winder, C.L., Weiner, M.W. Effects of metabolic and transport inhibitors on sodium transport and CO₂ production of toad bladders: Use of an uncoupling agent to distinguish between effects on transport and metabolism. *J. Pharmacol. Exp. Ther.*, 213:375-382, 1980. PMID: 6767841

Curriculum Vitae - Michael W. Weiner, M.D.

39. Weiner, M.W. Effects of furosemide and ethacrynic acid on sodium transport and CO₂ production of toad bladders: Evidence for direct inhibition of active transport. *J. Pharmacol. Exp. Ther.*, 213:383-389, 1980. PMID: 6767842
40. Weiner, M.W. Effects of sodium and potassium on energy metabolism and sodium transport of toad bladders. *J. Pharmacol. Exp. Ther.*, 213:390-394, 1980. PMID: 6767843
41. Levi, J., Jacobs, C., Kalman, S., McTigue, M., Weiner, M.W. Mechanism of cis-platinum nephrotoxicity: I. Effects of sulphydryl groups in rat kidneys. *J. Pharmacol. Exp. Ther.*, 213:545-550, 1980. PMID: 7193725
42. Dobyan, D.C., Levi, J., Jacobs, C., Kosek, J., Weiner, M.W. Mechanism of cis-platinum nephrotoxicity: II Morphologic observations. *J. Pharmacol. Exp. Ther.*, 213:551-556, 1980. PMID: 7193726
43. Spires, D.A., Weiner, M.W. Use of an uncoupling agent to distinguish between direct stimulation of metabolism and direct stimulation of transport: Investigation of antidiuretic hormone and aldosterone. *J. Pharmacol Exp. Ther.*, 214:507-515, 1980. PMID: 6249909
44. Weiner, M.W., Greene, K., Vreman, H., Wemmer, D., Jardetsky, N.W., Jardetsky, O. NMR measurements of metabolites in organs of live animals using chronically implanted radiofrequency coils. *IRCS Medical Science*, 8:671, 1980.
45. Jacobs, C., Kalman, S.M., Tretton, M., and Weiner, M.W. Renal handling of cis-diamminedichloroplatinum (II). *Cancer Treatment Reports*, 64:1223-1226, 1980. PMID: 7193518
46. Vreman, H.J., Assomull, V.M., Kaiser, B.A., Blaschke, T.F., Weiner, M.W. Acetate metabolism and acid-base homeostasis during hemodialysis: Influence of dialyzer efficiency and rate of acetate metabolism. *Kidney Intl.*, 10:S62-S74, 1980. PMID: 6934339
47. Vreman, H.J., Venter, C., Leegwater, J., Oliver, C., Weiner, M.W. Taste, smell and zinc metabolism in patients with chronic renal failure. *Nephron*, 26:163-170, 1980. PMID: 7432578
48. Kaiser, B.A., Potter, D.E., Bryant, R.E., Vreman, H.J., Weiner, M.W. Acid-base changes and acetate metabolism during routine and high efficiency hemodialysis in children. *Kidney Intl.*, 19:70-79, 1981. PMID: 6783778
49. Richards, R.H., Vreman, H.J., Zager, P., Feldman, C., Blaschke, T., Weiner, M.W. Acetate metabolism in normal human subjects. *Am. J. Kid. Diseases*, 2(1):47-57, 1982. PMID: 6808830

Curriculum Vitae - Michael W. Weiner, M.D.

50. Cunarro, J.A., Schultz, S.E., Johnson, W.A., Weiner, M.W. Effects of ischemia on metabolite concentrations in dog renal cortex. *Renal Physiol. Basel*, 5(3):143-155, 1982. PMID: 6125003
51. Weiner, M.W., Jacobs, C. Mechanism of cisplatin nephrotoxicity. *Fed. Proc.*, 42:2974-2978, 1983. PMID: 6684595
52. Weiner, M.W. Acetate metabolism during hemodialysis. *Artificial Organs*, 6:370-377, 1982. PMID: 6762188
53. Weiner, M.W. Acetate dialysate vs. bicarbonate dialysate. *Trans. Amer. Soc. of Artificial Internal Organs*, 28:661-662, 1982.
54. McTigue, M., Ting, G.O., Weiner, M.W. Relationship between sodium transport and oxygen consumption in the isolated perfused rat kidney. *Renal Physiology*, 6:112-129, 1983. PMID: 6867464
55. Karczmar, G.S., Koretsky, A.P., Bissell, M.J., Klein, M.P., Weiner, M.W. A device for maintaining viable cells at high densities for NMR studies. *J. Magn. Res.*, 53:123-128, 1983.
56. Koretsky, A.P., Wang, S., Murphy-Boesch, J., Klein, M.P., James, T.L., Weiner, M.W. ^{31}P NMR spectroscopy of rat organs, *in situ*, using chronically implanted radiofrequency coils. *Proc. Nat. Acad. Sci. U.S.A.*, 80:7491-7495, 1983. PMC389977
57. Geiser, M.T., Van Dyke, C., East, R., Weiner, M.W. Psychological reactions to continuous ambulatory peritoneal dialysis. *Intl. J. Psych. Med.*, 13:299-307, 1984.
58. Gonzalez-Mendez, R., Litt, L., Koretsky, A.P., Von Golditz, J., Weiner, M.W., James, T.L. Comparison of ^{31}P NMR spectra of *in vivo* rat brain using convolution difference and saturation with a surface coil: Source of the broad component in the brain spectrum. *J. Mag. Reson.*, 57:526-533 1984.
59. Weiner, M.W., Adam, W.R. Magnetic Resonance Spectroscopy for evaluation of renal function. *Seminars in Urology*, 3:34-42, 1985. PMID: 3890058
60. Koretsky, A.P., Basus, J.V., James, T.L., Klein, M.P., Weiner, M.W. Detection of exchange reactions involving small metabolite pools using NMR magnetization transfer techniques: relevance to subcellular compartmentation of creatine kinase. *Mag. Res. Med.*, 2:586-594, 1985. PMID: 3880100
61. Adam WR, Koretsky AP, Weiner MW.: Measurement of renal intracellular pH by ^{31}P NMR. Relationship of pH to ammoniogenesis. *Contrib Nephrol*, 47: 15-21, 1985. PMID: 4064687

Curriculum Vitae - Michael W. Weiner, M.D.

62. Koretsky, A.P., Wang, S., Klein, M.P., James, T.L., Weiner, M.W. ^{31}P NMR saturation transfer measurements of phosphorus exchange reactions in rat heart and kidney in situ. *Biochem.*, 25:77-84, 1986. PMID: 3954995
63. Karczmar, G.S., Weiner, M.W. A single acquisition localization technique. *Mag. Res. Med.*, 3:341-345, 1986. PMID: 3713500
64. Weiner, M.W. Magnetic resonance measurements of renal metabolism, structure, and function. *Seminars in Nephrology*, 6:139-152, 1986. PMID: 3303240
65. Adam, W.R., Koretsky, A.P., Weiner, M.W. Measurement of renal intracellular pH in rats in vivo using ^{31}P NMR: Effects of acidosis and K depletion. *Am. J. Physiol.*, 251:F904-F910, 1986. PMID: 3777186
66. Shine, N.R., Xuan, J.A., Koretsky, A.P., Weiner, M.W. Determination of renal molar concentrations of phosphorous containing metabolites in vivo using ^{31}P NMR. *Mag. Reson. Med.*, 4:244-251, 1987. PMID: 3574058
67. Weiner, M.W. NMR spectroscopy for clinical medicine animal models and clinical examples. *Ann. N.Y. Acad. Sci.*, 508:287-299, 1987. PMID: 3326457
68. Shine, N.R., Adam, W.P., Xuan, J.A., Weiner, M.W. NMR Studies of renal metabolism: regulation of renal function by ATP and pH. *Ann. N.Y. Acad. Sci.*, 508:99-108, 1987. PMID: 3439715
69. Weiner, M.W. Investigation of cardiac ischemia and tumor therapy with magnetic resonance spectroscopy. *Proceedings of Internationales Kernspintornographie Symposium Garmisch Partenkirchen*. pp. 331-334. Ed: Lissner, J., 1987.
70. Miller, R.G., Giannini, D., Milner-Brown, H.S., Layzer, R.B., Koretsky, A.P., Hooper, D., Weiner, M.W. Effects of fatiguing exercise on high-energy phosphates, force, and EMG: Evidence for 3 phases of recovery. *Muscle & Nerve*, 10:810-821, 1987. PMID: 3683452
71. Karczmar, G.S., Weiner, M.W., Matson, G.B. Detection of residual z magnetization: application to the surface coil rotating frame experiment. *Magn. Reson. Med.*, 71:360-364, 1987.
72. Adam, W.R., Koretsky, A.P., Weiner, M.W. Measurement of tissue potassium in vivo using ^{39}K nuclear magnetic resonance. *Biophys. J.*, 51:265-271, 1987. PMC1329887
73. Vink, R., McIntosh, T., Weiner, M.W., Faden, A.I. Effects of traumatic brain injury on cerebral high-energy phosphates and pH. *J. Cereb. Blood Flow*, 7:563-571, 1987. PMID: 3654796

Curriculum Vitae - Michael W. Weiner, M.D.

74. Vink, R., McIntosh, T.K., Fernyak, S.E., Weiner, M.W., Faden, A.I. Proton and phosphorus NMR studies of traumatic brain injury in rats. *Ann. N.Y. Acad. Sci.*, 508:497-500, 1987.
75. Karczmar, G.S., Lawry, T.J., Weiner, M.W., Matson, G.B. Shaped pulses for slice selection in the rotating frame - a study using computer simulations. *J. Magn. Reson.*, 76:41-53, 1988.
76. Vink, R., McIntosh, T.K., Demediuk, P., Weiner, M.W., Faden A.I. Decline in intracellular free Mg²⁺ is associated with irreversible tissue injury after brain trauma. *J. Biol. Chem.*, 263:757-761, 1988. PMID: 3335524
77. Adam, W.R., Koretsky, A.P., Weiner, M.W. Potassium adaptation: ³⁹K NMR evidence for intracellular compartmentalization of K⁺. *Amer. J. Physiol.: Renal, Fluid and Electrolyte Physiol.*, 23:F401-F406, 1988. PMID: 3348417
78. Miller, R.G., Boska, M.D., Moussavi, R.S., Carson, P.J., Weiner, M.W. ³¹P NMR studies of high-energy phosphates and pH in human muscle fatigue: comparison of aerobic and anaerobic exercise. *J. Clin. Invest.*, 81:1190-1196, 1988. PMC329648
79. Karczmar, G.S., Twieg, D.B., Lawry, T.J., Matson, G.B., Weiner, M.W. Detection of motion using B₁ gradients. *Magn. Reson. Med.*, 7:111-116, 1988. PMID: 2968494
80. Weiner, M.W. The promise of magnetic resonance spectroscopy for medical diagnosis. *Invest. Radiol.*, 23:253-261, 1988. PMID: 3286573
81. Roth, K., Hubesch, B., Meyerhoff, D.J., Naruse, S., Gober, J., Lawry, T., Boska, M., Matson, G., Weiner, M.W. Non-invasive quantitation of phosphorous metabolites in human tissue by NMR spectroscopy. *J. Mag. Reson.*, 81:299-311, 1988.
82. Karczmar, G.S., Shine, N., Lawry, T.J., Weiner, M.W., Matson, G.B. Improvement of the rotating frame experiment by detection of residual Z magnetization: A ³¹P MRS study of metabolite levels in a Meth-A sarcoma. *NMR in Biomedicine*, 1:159-164, 1988. PMID: 2641281
83. Arbeit, J.A., Toy, B.J., Karczmar, G.S., Hubesch, A., Weiner, M.W. Inhibition of tumor high-energy phosphate metabolism by insulin combined with rhodamine 123. *Surgery*, 104:161-170, 1988. PMID: 3041641
84. Camacho, S.A., Lanzer, P., Toy, B.J., Gober, J., Botvinick, E., Weiner, M.W. In vivo alterations of high-energy phosphates and intracellular pH during reversible regional ischemia: a ³¹P magnetic resonance spectroscopy study. *Amer. Heart J.*, 116:701-708, 1988. PMID: 3414485
85. Matson, G.B., Twieg, D.B., Karczmar, G.S., Lawry, T.J., Gober, J.R., Valenza, M., Boska, M.D., Weiner, M.W. Image-guided surface coil ³¹P MRS of human liver, heart, and kidney. *Radiology*, 169:541-547, 1988. PMID: 3051120

Curriculum Vitae - Michael W. Weiner, M.D.

86. Schaefer, S., Gober, J., Valenza, M., Karczmar, G., Matson, G., Camacho, A., Botvinick, E., Massie, B., Weiner, M.W. Nuclear magnetic resonance imaging guided ^{31}P Phosphorous spectroscopy of the human heart. *J. Am. Col. Cardiol.*, 12:1444-1455, 1988.
87. Lawry, T.J., Karczmar, G.S., Weiner, M.W., Matson, G.B. Computer simulation of MRS localization techniques: an analysis of ISIS. *Mag. Reson. Med.*, 9:299-314, 1989. PMID: 2540398
88. Miller, R.G., Carson, P.J., Moussavi, R.S., Boska, M.D., Weiner, M.W. The use of magnetic resonance spectroscopy to evaluate muscular fatigue and human muscle disease. *Applied Radiology*, 18:33-38, 1989.
89. Karczmar, G.S., Tavares, N.J., Weiner, M.W. A ^{31}P NMR study of the GI tract: effect of fructose loading and measurement of transverse relaxation times. *Magn. Reson. Med.*, 9:8-15, 1989. PMID: 2709997
90. Schaefer, S., Camacho, S.A., Gober, J.R., Obregon, R.G., DeGroot, M.A., Botvinick, E.H., Massie, B., Weiner, M.W. Response of myocardial metabolites to graded regional ischemia: ^{31}P NMR spectroscopy of porcine myocardium in vivo. *Circ. Res.*, 64:968-976, 1989. PMID: 2706762
91. Shine, N., Palladino, M.A., Patton, J.S., Deisseroth, A., Karczmar, G.S., Matson, G.B., Weiner, M.W. Tumor necrosis factor produces rapid depletion of high-energy phosphates in a mouse sarcoma: A ^{31}P NMR study. *Cancer Research*, 49:2123-2127, 1989. PMID: 2702653
92. Moussavi, R.S., Carson, P.J., Boska, M.D., Weiner, M.W., Miller, R.G. Nonmetabolic fatigue in exercising human muscle. *Neurology*, 39:1222-1226, 1989. PMID: 2771074
93. Weiner, M.W. MR spectroscopic imaging approaches the clinical realm. *Diagnostic Imaging*, 11:48-52, 1989.
94. Baker, A.J., Carson, P.J., Miller, R.G., Weiner, M.W. Investigations of muscle bioenergetics. *Invest. Radiol.*, 24:1001-1005, 1989. PMID: 2691438
95. Hubesch, B., Sappey-Marinier, D., Hetherington, H., Twieg, D., Weiner, M.W. ^{31}P MRS studies of human brain. *Investigative Radiology*, 24:1039-1042, 1989. PMID: 2558086
96. Schaefer, S., Schwartz, G.S., Gober, J.R., Massie, B., Weiner, M.W. Magnetic resonance spectroscopy: Evaluation of ischemic heart disease. *Investigative Radiology*, 24:969-972, 1989. PMID: 269144
97. Karczmar, G.S., Meyerhoff, D.J., Speder, A., Valone, F., Wilkinson, M., Shine, N., Boska, M.D., Weiner, M.W. Response of tumors to therapy studied by magnetic resonance. *Investigative Radiology*, 24:1020-1023, 1989. PMID: 2606630

Curriculum Vitae - Michael W. Weiner, M.D.

98. Meyerhoff, D.J., Karczmar, G.S., Weiner, M.W. Abnormalities of the liver evaluated by ^{31}P MRS. *Investigative Radiology*, 24:980-984, 1989. PMID: 2606636
99. Twieg, D.B., Meyerhoff, D.J., Hubesch, B., Roth, K., Sappey-Marinier, D., Boska, M.D., Gober, J., Schaefer, S., and Weiner, M.W. Localized phosphorus-31 MRS in humans by spectroscopic imaging. *Magnetic Resonance in Medicine*, 12:291-305, 1989. PMID: 2628680
100. Weiner, M.W., Hetherington, H.P. The power of the proton. *Editorial in Radiology*, 172:318-320, 1989. PMID: 2748810
101. Karczmar, G.S., Kurtz, T., Jalles-Tavares, N., Morris, R.C., Weiner, M.W. Regulation of hepatic inorganic phosphate and ATP in rats in response to fructose loading: an in vivo ^{31}P NMR study. *Biochimica et Biophysica Acta*, 1012:121-127, 1989. PMID: 2742879
102. Weiner, M.W., Hetherington, H., Hubesch, B., Karczmar, G., Massie, B., Maudsley, A., Meyerhoff, D.J., Sappey-Marinier, D., Schaefer, S., Twieg, D.B., Matson, G.B. Clinical magnetic resonance spectroscopy of brain, heart, liver, kidney, and cancer: A quantitative approach. *NMR in Biomedicine*, 2:290-297, 1989. PMID: 2701809
103. Meyerhoff, D.J., Karczmar, G.S., Matson, G.B., Boska, M.D., Weiner, M.W. Non-invasive quantitation of human liver metabolites using image-guided ^{31}P magnetic resonance spectroscopy. *NMR in Biomedicine*, 3:17-22, 1989. PMID: 2390449
104. Jadvar, H., Gober, J.R., Schaefer, S., Schwartz, G.S., Weiner, M.W., and Massie, B. Potential utility of esophageal pacing during cardiac magnetic resonance studies. *American Journal of Electromedicine*, 20:134-137, 1989.
105. Schaefer S, Massie B, Weiner MW.: Magnetic resonance spectroscopy of the heart. *Cardiol Clin*, 7(3): 697-712, 1989. PMID: 2670234
106. Gober, J., Schaefer, S., Camacho, S.A., DeGroot, M., Obregon, R., Botvinick, E., Weiner, M.W., Massie, B. Epicardial and endocardial localized ^{31}P magnetic resonance spectroscopy: evidence for metabolic heterogeneity during regional ischemia. *Magnetic Resonance in Medicine*, 13:204-215, 1990. PMID: 2314211
107. Boska, M.D., Hubesch, B., Meyerhoff, D.J., Twieg, D.B., Karczmar, G.S., Matson, G.B., Weiner, M.W. Comparison of ^{31}P MRS and ^1H MRI at 1.5 and 2.0 Tesla. *Magnetic Resonance in Medicine*, 13:228-238, 1990. PMID: 2314213
108. Boska, M.D., Moussavi, R.S., Carson, P.J., Weiner, M.W., Miller, R.G. The metabolic basis of recovery after fatiguing exercise of human muscle. *Neurology*, 40:240-244, 1990. PMID: 2300242

Curriculum Vitae - Michael W. Weiner, M.D.

109. Weiner, M.W. Magnetic resonance spectroscopy and spectroscopic imaging. Admin. Radiol., 9:32-40, 1990. PMID: 10103772
110. Schaefer, S., Schwartz, G.G., Gober, J.R., Wong, A.K., Camacho, S.A., Massie, B., Weiner, M.W. Relationship between myocardial metabolites and contractile abnormalities during graded regional ischemia: ^{31}P NMR studies of porcine myocardium in vivo. Journal of Clinical Investigation, 85:706-713, 1990. PMC296486
111. Hubesch, B., Sappey-Marinier, D., Roth, K., Meyerhoff, D.J., Matson, G.B., Weiner, M.W. ^{31}P NMR spectroscopy of normal human brain and brain tumors. Radiology, 174:401-409, 1990. PMID: 2296651
112. Meyerhoff, D.J., Boska, M.D., Thomas, M.A., Weiner, M.W. Alcoholic liver disease: Quantitative image-guided ^{31}P magnetic resonance spectroscopy. Radiology, 173:393-400, 1990. PMID: 2798871
113. Boska, M.D., Meyerhoff, D.J., Twieg, D.J., Karczmar, G.S., Matson, G.B., Weiner, M.W. Image-guided ^{31}P magnetic resonance spectroscopy of orthotopic and transplanted human kidneys. Kidney International, 38:294-300, 1990. PMID: 2402121
114. Miller, R.G., Green, A.T., Moussavi, R.S., Carson, P.J., Weiner, M.W. Excessive muscular fatigue in patients with spastic paraparesis. Neurology, 40:1271-1274, 1990. PMID: 2381537
115. Schaefer, S., Gober, J.R., Schwartz, G.S., Twieg, D.B., Weiner, M.W., Massie, B. In vivo phosphorus-31 spectroscopic imaging in patients with global myocardial disease. American Journal of Cardiology, 65:1154-1161, 1990. PMID: 2139540
116. Shine, N., Xuan, A., Weiner, M.W. ^{31}P NMR studies of ATP concentrations and Pi-ATP exchange in the rat kidney in vivo: Effects of inhibiting and stimulating renal metabolism. Magnetic Resonance in Medicine, 14:445-460, 1990. PMID: 2355828
117. Thomas, M.A., Narayan, P., Kurhanewicz, J., Jajodia, P., Weiner, M.W. ^1H MR spectroscopy of normal and malignant human prostates in vivo. Journal of Magnetic Resonance, 87:610-619, 1990.
118. Maudsley, A.A., Twieg, D.B., Sappey-Marinier, D.S., Hubesch, B., Hugg, J.W., Matson, G.B., Weiner, M.W. Spin echo ^{31}P spectroscopic imaging in the human brain. Magnetic Resonance in Medicine, 14:415-422, 1990. PMID: 2345522
119. Schwartz, G.S., Schaefer, S., Gober, J.R., Meyerhoff, D.J., Smekal, A., Massie, B., Weiner, M.W. Myocardial high-energy phosphates in reactive hyperemia. Am J Physiol, 259:H1190-H1196, 1990. PMID: 2221125
120. Weiner, M.W., Jones, R. New tools for clinicians: magnetic resonance spectroscopic imaging. Hospimedica, 8:32-46, 1990.

Curriculum Vitae - Michael W. Weiner, M.D.

121. Weiner, M.W., Moussavi, R.S., Baker, A.J., Boska, M.D., Miller, R.G. Constant relationship between force, phosphate concentration and pH in muscles with differential fatigability. *Neurology*, 40:1888-1893, 1990. PMID: 2247239
122. Schwartz, G.S., Schaefer, S., Meyerhoff, D.J., Massie, B., Weiner, M.W. The dynamic relationship between myocardial contractility and energy metabolism during and following brief coronary occlusion in the pig. *Circulation Research*, 67:490-500, 1990. PMID: 2376083
123. Kurhanewicz, J., Thomas, A., Jajodia, P., Weiner, M., James, T.L., Vigneron, D.B., Narayan, P. ^{31}P Spectroscopy of the human prostate gland *in vivo* using a transrectal probe. *Magnetic Resonance in Medicine*, 22:404-413, 1991. PMID: 1725918
124. Deicken, R., Hubesch, B., Jensen, P., Sappey-Marinier, D., Krell, P., Wisniewski, A., Vanderburg, D., Parks, R., Fein, G., Weiner, M.W. Alterations in brain phosphate metabolite concentrations in patients with HIV infection. *Archives of Neurology*, 48:203-209, 1991. PMID: 1993012
125. Karczmar, G., Meyerhoff, D.J., Boska, M.D., Hubesch, B., Poole, J., Matson, G.B., Valone, F., Weiner, M.W.: ^{31}P MRS study of response of superficial human tumors to therapy. (^{31}P Spectroscopy Study of Response of Superficial Human Tumors to Therapy) *Radiology*, 179:149-153, 1991. PMID: 2006266
126. Gober, J.R., Schwartz, G.S., Schaefer, S., Massie, B., Matson, G.B., Weiner, M.W., Karczmar, G. ^{31}P MRS of myocardial inorganic phosphate using radiofrequency gradient echoes. *Magnetic Resonance in Medicine*, 20:171-183, 1991. PMID: 1775045
127. Narayan, P., Jajodia, P., Kurhanewicz, J., Thomas, A., MacDonald, J., Hubesch, B., Hedgcock, M., Anderson, C.M., James, T.L., Tanagho, E.A., Weiner, M.W. Characterization of prostate cancer, benign prostatic hyperplasia and normal prostates using transrectal ^{31}P Phosphorus magnetic resonance spectroscopy: a preliminary report. *J Urol*, 146:66-74, 1991. PMID: 1711587
128. Schwartz, G.S., Schaefer, S., Trocha, S.D., Steinman, S., Gober, J., Massie, B., Weiner, M.W. Metabolic and functional consequences of blunted myocardial reactive hyperemia. *Amer J Physiol*, 261:H892-H900, 1991.
129. Roth, K., Weiner, M.W. Determination of cytosolic ADP and AMP concentrations and the free energy of ATP hydrolysis in human muscle and brain tissues with ^{31}P NMR spectroscopy. *Magnetic Resonance in Medicine*, 22:505-511, 1991. PMID: 1812384
130. Miller, R.G., Carson, P.J., Moussavi, R.S., Green, A.T., Baker, A.J., Weiner, M.W. Fatigue and myalgia in AIDS patients. *Neurology*, 41:1603-1607, 1991. PMID: 1922802
131. Lawry, T.J., Weiner, M.W., Matson, G.B. Computer modeling of surface coil sensitivity. *Magnetic Resonance in Medicine*, 16:294-302, 1991. PMID: 2266848

Curriculum Vitae - Michael W. Weiner, M.D.

132. Minotti, J.R., Christoph, I., Oka, R., Weiner, M.W., Wells, L., Massie, B.M. Impaired skeletal muscle function in patients with congestive heart failure: Relationship to systemic exercise performance. *Journal of Clinical Investigation*, 88:2077-2082, 1991. PMC295805
133. Sappey-Marinier, D., Hubesch, B., Matson, G.B., Weiner, M.W. Decreased phosphorus metabolites and alkalosis in chronic cerebral infarction. *Radiology*, 182:29-34, 1992. PMID: 1727305
134. Karczmar, G.S., Arbeit, J.A., Toy, B.J., Speder, A., Weiner, M.W. Selective ATP depletion in a rodent sarcoma by insulin-induced substrate deprivation and inhibition of glycolysis by 2-deoxyglucose. *Cancer Research*, 52:71-76, 1992. PMID: 1727388
135. Hugg, J.W., Matson, G.B., Twieg, D.B., Maudsley, A.A., Sappey-Marinier, D., and Weiner, M.W.: Phosphorus-31 MR spectroscopic imaging (MRSI) of normal and pathological human brains. *Magnetic Resonance Imaging*, 10(2):227-243, 1992. PMID: 1564992
136. Schwartz, G.G., Steinman, S., Garcia, J., Greyson, C., Massie, B.M., Weiner, M.W. Energetics of acute pressure overload of the porcine right ventricle: In vivo ^{31}P NMR spectroscopy. *Journal of Clinical Investigation*, 89:909-918, 1992. PMC442937
137. Duijn, J.H., Matson, G.B., Maudsley, A.A., and Weiner, M.W.: 3D phase encoding ^1H spectroscopic imaging of human brain. *Magnetic Resonance Imaging*, 10(2):315-319, 1992. PMID: 1564998
138. Sappey-Marinier, D., Deicken, R., Fein, G., Hubesch, B., Van Dyke, C., Dillon, W., Davenport, L., Meyerhoff, D.J., Weiner, M.W. Alterations in brain phosphorus metabolite concentrations associated with areas of high signal intensity in white matter at MR imaging. *Radiology*, 183:247-256, 1992. PMID: 1549681
139. Meyerhoff, D.J., Maudsley, A.A., Schaefer, S., and Weiner, M.W.: Phosphorus-31 magnetic resonance metabolite imaging in the human body. *Magnetic Resonance Imaging*, 10(2):245-256, 1992. PMID: 1564993
140. Fernandez, E.J., Maudsley, A.A., Higuchi, T., and Weiner, M.W.: ^1H Spectroscopic Imaging of Rat Brain at 7 Tesla. *Magnetic Resonance in Medicine*, 25:107-119, 1992. PMID: 1350655
141. Brandes, R., Figueredo, V.M., Camacho, S.A., Massie, B.M., Weiner, M.W. Suppression of motion artifacts in fluorescence spectroscopy of perfused hearts. *Amer J Physiol*, 263:H972-H980, 1992. PMID: 1415626
142. Schwartz, G.G., Steinman, S.K., Weiner, M.W., Matson, G.B. In vivo ^{31}P NMR Spectroscopy of the right ventricle in pigs. *Amer. J. Physiol*, 262:H1950-1954, 1992. PMID: 1621852

Curriculum Vitae - Michael W. Weiner, M.D.

143. Greyson, C., Weiner, M.W. Current status of cardiac magnetic resonance spectroscopy. *Current Opinion in Radiology*, 4(IV): 48-54, 1992. PMID: 1627451
144. Schaefer, S., Schwartz, G.G., Steinman, S.K., Meyerhoff, D.J., Massie, B.M., Weiner, M.W. Metabolic response of the human heart to inotropic stimulation: *in vivo* phosphorus-31 studies of normal and cardiomyopathic myocardium. *Magnetic Resonance in Medicine*, 25:260-272, 1992. PMID: 1614310
145. Saprey-Marinier, D., Calabrese, G., Hetherington, H.P., Fisher, S.N.G., Deicken, R., Fein, G., Weiner, M.W. Proton magnetic resonance spectroscopy of human brain: applications to normal white matter, chronic infarction, and MRI white matter signal hyperintensities. *Magnetic Resonance in Medicine*, 26:313-327, 1992. PMID: 1513253
146. Laxer, K.D., Hubesch, B., Saprey-Marinier, D., Weiner, M.W. Increased pH and inorganic phosphate in temporal seizure foci: demonstrated by ^{31}P MRS. *Epilepsia*, 33:618-623, 1992. PMID: 1628574
147. Baker, A.J., Carson, P.J., Green, A.T., Miller, R.G., Weiner, M.W. The influence of human muscle length on energy transduction studied by ^{31}P NMR. *J. Appl. Physiol*, 73:160-165, 1992.
148. Thomas, M.A., Narayan, P., Kurhanewicz, P., Jajodia, P., James, T.L., Weiner, M.W. Detection of phosphorus metabolites in human prostates with a transrectal ^{31}P NMR probe. *J. Magn. Reson.*, 99:377-386, 1992.
149. Duijn, J.H., Matson, G.B., Maudsley, A.A., Hugg, J.W., and Weiner, M.W.: Human Brain Infarction: Proton MR spectroscopy. *Radiology*, 183(3):711-718, 1992. PMID: 1584925
150. Meyerhoff, D.J., Karczmar, G.S., Venook, A., Valone, F., Wilkinson, M., Matson, G.B., Weiner, M.W. Hepatic cancers and their response to chemoembolization therapy: Image-guided ^{31}P MR spectroscopy. *Investigative Radiology*, 27:456-464, 1992. PMID: 1318873
151. Hugg, J.W., Duijn, J.H., Matson, G.B., Maudsley, A.A., Tsuruda, J.S., Gelinas, D.F., and Weiner, M.W.: Elevated Lactate and Alkalosis in Chronic Human Brain Infarction Observed by ^1H and ^{31}P MR Spectroscopic Imaging. *Journal of Cerebral Blood Flow and Metabolism*, 12(5):734-744, 1992. PMID: 1506441
152. Maudsley, A.A., Lin, E., and Weiner, M.W.: Spectroscopic Imaging Display and Analysis. *Magnetic Resonance Imaging*, 10(3):471-485, 1992. PMID: 1406098
153. Meyerhoff, D.J., Maudsley, A.A., Husted, C., and Weiner, M.W.: MRSI Detects Biochemical Changes Before Anatomical Changes Become Evident on MRI. *Spectroscopic imaging combines advantages of MRS and MRI*. *Magnetic Resonance*, Fall:47-52, 1992.

Curriculum Vitae - Michael W. Weiner, M.D.

154. Deicken, R.F., Calabrese, G., Raz, J., Saprey-Marinier, D., Meyerhoff, D., Dillon, W.P., Weiner, M.W., Fein, G. A ^{31}P Phosphorus magnetic resonance spectroscopy study of diazepam does not affect brain phosphorus metabolism. *Biological Psychiatry*, 32:628-631, 1992. PMID: 1450289
155. Figueredo, V.M, Brandes, R., Weiner, M.W., Massie, B.M., Camacho, S.A. Cardiac contractile dysfunction during mild coronary flow reductions is due to an altered calcium-pressure relationship in rat hearts. *Journal of Clinical Investigation*, 90:1794-1802, 1992. PMC443238
156. Saprey-Marinier, D., Bonmartin, A., Weiner, M.W. Etude des maladies cérébrales par spectroscopie localisée et imagerie spectroscopique RMN. *J Med. Nucl. Biophys.*, 16:401-411, 1992.
157. Saprey-Marinier, D., Bonmartin, A., Weiner, M.W. Metabolic studies of brain by NMR localized spectroscopy and spectroscopic imaging. *Proc Int Conf IEEE*, 14:259-263, 1992.
158. Gordon, L., Levinsohn, D.G., Borowsky, C.D., Manojlovic, R.D., Sessler, D.I., Weiner, M.W., and Baker, A.J.: Improved preservation of skeletal muscle in amputated limbs using pulsatile hypothermic perfusion with University of Wisconsin Solution: A preliminary study. *J. Bone Joint Surg* 74:1358-1366, 1992. PMID: 1429791
159. Saprey-Marinier, D., Calabrese, G., Fein, G., Hugg, J.W., Biggins, C., and Weiner, M.W.: Effect of photic stimulation on human visual cortex, lactate and phosphates using ^1H and ^{31}P magnetic resonance spectroscopy. *J. Cerebral Blood Flow Metabolism* 12:584-592, 1992. PMID: 1618937
160. Schwartz, G.G., Schaefer, S., Trocha, S.D., Garcia, J., Steinman, S.K., Massie, B, and Weiner, M.W.: Effect of supranormal coronary blood flow on energetics and contractility of the porcine left ventricle. *Cardiovascular Research* 26:1001-1006, 1992. PMID: 1486583
161. Fernandez, E.J., Maudsley, A.A., Higuchi, T., and Weiner, M.W.: Three-dimensional ^1H spectroscopic imaging of cerebral metabolites in the rat using surface coils. *Magnetic Resonance Imaging*, 10(6):965-974, 1992. PMID: 1461094
162. Schaefer, S., Schwartz, G.G., Wisneski, J.A., Neese, R.A., Trocha, S.D., Christoph, I., Steinman, S.K., Garcia, J., Massie, B.M., and Weiner, M.W.: Response of high energy phosphate and lactate released during prolonged regional ischemia *in vivo*. *Circulation* 85:342-349, 1992.
163. Schaefer S, Schwartz GG, Wisneski JA, Trocha SD, Christoph I, Steinman SK, Garcia J, Massie BM, Weiner MW.: Response of high-energy phosphates and lactate release during prolonged regional ischemia in vivo. *Circulation*, 85(1): 342-9, 1992. PMID: 1728466

Curriculum Vitae - Michael W. Weiner, M.D.

164. Hugg JW, Duijn JH, Matson GB, Maudsley AA, Tsuruda JS, Gelinas DF, Weiner MW.: Elevated lactate and alkalosis in chronic human brain infarction observed by ¹H and ³¹P MR spectroscopic imaging. *J Cereb Blood Flow Metab*, 12(5): 734-44, 1992. PMID: 1506441
165. Figueredo, V.M., Brandes, R., Weiner, M.W., Massie, B.M., and Camacho, S.A.: Endocardial versus epicardial differences of intracellular free calcium under normal and ischemic conditions in perfused rat hearts. *Circulation Research* 72:1082-1090, 1993. PMID: 8477520
166. Nagai, Y., Naruse, S., and Weiner, M.W.: Effect of hypoglycemia on changes of brain lactic acid and pH produced by ischemia. *NMR in Biomedicine* 6:1-6, 1993. PMID: 8457423
167. Calabrese, G., Deicken, R.F., Fein, G., Merrin, E.L., Schoenfeld, F., and Weiner, M.W.: ³¹Phosphorus magnetic resonance spectroscopy of the temporal lobes in schizophrenia. *Biological Psychiatry* 32:26-32, 1993. PMID: 1391294
168. DeGroot M., Massie B., Boska M., Gober J.R., Miller, R.G., and Weiner, M.W.: Dissociation of pH from fatigue and relationship of H₂PO₄⁻ to fatigue in human muscle. *Muscle and Nerve* 16:91-98, 1993. PMID: 8423837
169. Lara, R.S., Matson, G.B., Hugg, J.W., Maudsley, A.A., and Weiner, M.W.: Quantitation of in vivo phosphorus metabolites in human brain with magnetic resonance spectroscopic imaging (MRSI). *Magnetic Resonance Imaging*, 11(2):273-278, 1993. PMID: 8455438
170. Meyerhoff, D.J., MacKay, S., Bachman, L., Poole, N., Weiner, M.W., and Fein, G.: Reduced brain n-acetyl aspartate in cognitively impaired human immunodeficiency virus seropositive individuals suggests neuronal loss: *In vivo* ¹H magnetic resonance spectroscopic imaging. *Neurology* 43:509-515, 1993. PMID: 8450992
171. Miller, R.G., Moussavi, R.S., Green, A.T., Carson, P.J., and Weiner, M.W.: The distinctive fatigue of rapid repetitive movements. *Neurology* 43:755-761, 1993. PMID: 8469336
172. Baker, A.J., Longuemare, M.C., Brandes, R., and Weiner, M.W.: Intracellular tetanic calcium signals are reduced in fatigue of whole skeletal muscle. *Amer J Physiol* 264:C577-C582, 1993.
173. Kent-Braun, J.A., Sharma, K.R., Weiner, M.W., Massie, B., and Miller, R.G.: Central basis of muscle fatigue in chronic fatigue syndrome. *Neurology* 43:125-131, 1993. PMID: 8423875
174. Hugg, J.W., Laxer, K.D., Matson, G.B., Maudsley, A.A., Husted, C.A., and Weiner, M.W.: Lateralization of human focal epilepsy by ³¹P magnetic resonance spectroscopic imaging. *Neurology*, 42(10):2011-2018, 1993. PMID: 1407585
175. Camacho, S.A., Figueredo, V.M., Brandes, R., and Weiner, M.W.: Calcium-dependent fluorescence transients and phosphate metabolism during low-flow ischemia in perfused rat hearts. *Amer J Physiol* 34:H114-H122, 1993. PMID: 8342622

Curriculum Vitae - Michael W. Weiner, M.D.

176. Weiner, M.W.: Magnetic resonance spectroscopy and spectroscopic imaging: Studies at San Francisco Veterans Administration Medical Center. VA Practitioner, pp. 54-63, July 1993.
177. Kent-Braun, J.A., Miller, R.G., and Weiner, M.W.: Phases of metabolism during progressive exercise to fatigue in human skeletal muscle. *J. Appl. Physiol* 75:573-580, 1993. PMID: 8226454
178. Baker, A.J., Kostov, K.G., Miller, R.G., and Weiner, M.W.: Slow force recovery after long duration exercise: metabolic and activation factors in muscle fatigue. *Amer J Physiol* 274:2294-2300, 1993.
179. MacKay, S., Meyerhoff, D.J., Dillon, W.P., Weiner, M.W., and Fein, G.: Alteration of brain phospholipid metabolites in cocaine dependent polysubstance abusers. *Biological Psychiatry* 34:261-264, 1993. PMID: 8399823
180. Higuchi, T., Fernandez, E.J., Maudsley, A.A., and Weiner, M.W.: Mapping of Cerebral Metabolites in Rats by ^1H Magnetic Resonance Spectroscopic Imaging: Distribution of Metabolites in Normal Brain and Postmortem Changes. *NMR in Biomedicine*, 6:311-317, 1993. PMID: 8268063
181. Hugg, J.W., Laxer, K.D., Matson, G.B., Maudsley, A.A., and Weiner, M.W.: Neuron Loss Localizes Human Temporal Lobe Epilepsy by In Vivo Proton Magnetic Resonance Spectroscopic Imaging. *Annals of Neurology*, 34(6):788-794, 1993. PMID: 8250527
182. Brandes, R., Figueredo, V.M., Camacho, S.A., Baker, A., and Weiner, M.W.: Quantitation of $[\text{Ca}^{2+}]$ in whole perfused rat hearts using Indo-1 fluorometry. *Biophysical Journal* 65:1973-1982, 1993. PMC1225933
183. Matson, G.B., Meyerhoff, D.J., Lawry, T.J., Lara, R.S., Duijn, J., Deicken, R.F., and Weiner, M.W.: Use of computer simulations for quantitation of ^{31}P ISIS MRS results. *NMR in Biomedicine* 6:215-224, 1993. PMID: 8347456
184. Brandes, R., Figueredo, V.M., Camacho, S.A., Baker, A.J., and Weiner, M.W.: Investigation of factors affecting fluorometric quantitation of cytosolic $[\text{Ca}^{2+}]$ in perfused hearts. *Biophysical Journal* 65:1983-1993, 1993. PMC1225934
185. Maudsley, A.A., Matson, G.B., Hugg, J.W., and Weiner, M.W.: Display of metabolic information by MR Spectroscopic Imaging. *SPIE*, 1887:282-289, 1993.
186. Hugg, J.W., Laxer, K.D., and Weiner, M.W.: Focal epilepsy localization by magnetic resonance spectroscopic imaging. *Advances in Clinical Neurosciences* 3:011-026, 1993. PMID: 8250527

Curriculum Vitae - Michael W. Weiner, M.D.

187. Massie, B.M., Schwartz, G.G., Garcia, J., Steinman, S., Owens, T., Weiner, M.W., and Wisneski, J.A.: Myocardial metabolism during increased work states: Evidence for "demand ischemia" in the porcine heart *in vivo*. *Circulation Research* 74:64-73, 1994. PMID: 8261596
188. Sharma, K.R., Kent-Braun, J.A., Mynhier, M.A., Weiner, M.W., and Miller, R.G.: Excessive muscular fatigue in the post polio syndrome. *Neurology* 44:642-646, 1994. PMID: 8164817
189. Husted, C.A., Duijn, J.H., Matson, G.B., Maudsley, A.A., and Weiner, M.W.: Molar quantitation of *in vivo* proton metabolites in human brain with 3D magnetic resonance spectroscopic imaging. *Magnetic Resonance Imaging*, 12(4):661-667, 1994. PMID: 8057771
190. Graham, S.H., Meyerhoff, D.J., Bayne, L., Sharp, F.R., and Weiner, M.W.: Magnetic resonance spectroscopy of n-acetylaspartate in hypoxic-ischemic encephalopathy. *Annals of Neurology* 35:490-494, 1994. PMID: 8154879
191. Baker, A.J., Brandes, R., Schendel, T.M., Trocha, S.D., Miller, R.G., and Weiner, M.W.: Energy use by contractile and non-contractile processes in skeletal muscle estimated by ^{31}P NMR. *Amer J Physiology* 266:C825-C831, 1994. PMID: 8166246
192. Maudsley, A.A., Wu, Z., Meyerhoff, D.J., and Weiner, M.W.: Automated Processing for Proton Spectroscopic Imaging Using Water Reference Deconvolution. *Magnetic Resonance in Medicine*, 31:589-595, 1994. PMID: 8057811
193. Maudsley, A.A., Matson, G.B., Hugg, J.W., and Weiner, M.W.: Reduced Phase Encoding in Spectroscopic Imaging. *Magnetic Resonance in Medicine*, 31:645-651, 1994. PMID: 8057817
194. Vion-Dury, J., Meyerhoff, D.J., Cozzone, P.J., and Weiner, M.W.: What might be the impact on neurology of the analysis of brain metabolism by *in vivo* magnetic resonance spectroscopy. *J Neurology* 241:354-371, 1994. PMID: 7931430
195. Ebisu, T., Rooney, W.D., Graham, S.H., Weiner, M.W., and Maudsley, A.A.: N-Acetylaspartate as an In Vivo Marker of Neuronal Viability in Kainate-Induced Status Epilepticus: ^1H Magnetic Resonance Spectroscopic Imaging. *Journal of Cerebral Blood Flow and Metabolism*, 14(3):373-382, 1994. PMID: 8163579
196. Meyerhoff, D.J., MacKay, S., Constans, J-M., Norman, D., VanDyke, C., Fein, G., and Weiner, M.W.: Axonal injury and membrane alterations in Alzheimer's disease suggested by *in vivo* proton magnetic resonance spectroscopic imaging. *Annals of Neurology* 36:40-47, 1994. PMID: 8024260
197. Garcia, P.A., Laxer, K.D., Van der Grond, J., Hugg, J.W., Matson, G.B., and Weiner, M.W.: ^{31}P magnetic resonance spectroscopic imaging in patients with frontal lobe epilepsy. *Annals of Neurology* 35:217-221, 1994. PMID: 8109902

Curriculum Vitae - Michael W. Weiner, M.D.

198. Camacho, S.A., Brandes, R., Figueredo, V.M., and Weiner, M.W.: Ca^{2+} transient decline and myocardial relaxation are slowed during low-flow ischemia in rat hearts. *Journal of Clinical Investigation* 93:951-957, 1994. PMC294002
199. Brandes, R., Figueredo, V.M., Camacho, S.A., and Weiner, M.W.: Compensation for changes in tissue light absorption in fluorometry of hypoxic perfused rat hearts. *Amer. J. Physiology* 266:H2554-H2567, 1994. PMID: 8024018
200. Meyerhoff, D.J., MacKay, S., Poole, H., Dillon, W.P., Weiner, M.W., and Fein, G.: N-acetylaspartate reductions measured by ^1H MRSI in cognitively impaired HIV-seropositive individuals: Replication and extension. *Magnetic Resonance Imaging* 12:653-659, 1994. PMID: 8057770
201. Kent-Braun, J.A., Sharma, K.R., Miller, R.G., and Weiner, M.W.: Post exercise phosphocreatine resynthesis is slowed in multiple sclerosis. *Muscle and Nerve* 17:835-841, 1994. PMID: 8041390
202. Husted, C.A., Goodin, D.S., Hugg, J.W., Maudsley, A.A., Tsurda, J.S., de Bie, S.H., Fein, G., Matson, G.B., and Weiner, M.W.: Biochemical Alterations in Multiple Sclerosis Lesions and Normal-appearing White Matter Detected by In Vivo ^{31}P and ^1H Spectroscopic Imaging. *Annals of Neurology*, 36(2):157-165, 1994. PMID: 8053651
203. Husted, C.A., Matson, G.B., Adams, D.A., Goodkin, D.S., and Weiner, M.W.: *In vivo* detection of myelin phospholipids in multiple sclerosis with phosphorus magnetic resonance spectroscopic imaging. *Annals of Neurology* 36:239-241, 1994. PMID: 8053662
204. Baker, A.J., Carson, P.J., Miller, R.G., and Weiner, M.W.: Metabolic and nonmetabolic components of fatigue monitored with ^{31}P -NMR. *Muscle and Nerve* 17:1002-1009, 1994. PMID: 8065387
205. Deicken, R.F., Calabrese, G., Merrin, E.L., Meyerhoff, D.J., Dillon, W.P., Weiner, M.W., and Fein, G.: ^{31}P Phosphorus magnetic resonance spectroscopy of the frontal and parietal lobes in chronic schizophrenia. *Biological Psychiatry* 36:503-510, 1994. PMID: 7827212
206. Baker, A.J., Brandes, R., Schreur, J.H.M., Camacho, S.A., and Weiner, M.W.: Protein and acidosis alter calcium-binding and fluorescence spectra of the calcium indicator indo-1. *Biophysical Journal* 67:1646-1654, 1994. PMC1225526
207. Kent-Braun, J.A., Sharma, K.R., Weiner, M.W., and Miller, R.G.: Effects of exercise on muscle activation and metabolism in multiple sclerosis. *Muscle & Nerve* 17:1162-1169, 1994. PMID: 7935523
208. Schaefer, S., Schwartz, G.S., Steinman, S.K., Garcia, J., Trocha, S.D., Weiner, M.W., and Massie, B.M.: Effects of regional myocardial lidocaine infusion on high-energy phosphates. *J. Mol. Cell. Cardiol.* 26:1601-1611, 1994. PMID: 7731055

Curriculum Vitae - Michael W. Weiner, M.D.

209. Sharma, K.R., Kent-Braun, J.A., Majumdar, S., Huang, Y., Mynhier, M., Weiner, M.W., Miller, R.G. Physiology of fatigue in amyotrophic lateral sclerosis. *Neurology* 45:733-740, 1995. PMID: 7723963
210. Massie, B.M., Schaefer, S., Garcia, J., McKirnan, M.D., Schwartz, G.G., Wisneski, J.A., Weiner, M.W., and White Francis, C.: Myocardial high energy phosphate and substrate metabolism in swine with moderate left ventricular hypertrophy. *Circulation* 91:1814-1823, 1995. PMID: 7882492
211. Garcia, P.A., Laxer, K.D., Grond, J.V.D., Hugg, J.W., Matson, G.B., and Weiner, M.W.: Proton magnetic resonance spectroscopic imaging in patients with frontal lobe epilepsy. *Annals of Neurology* 37:279-281, 1995. PMID: 7847871
212. Deicken, R.F., Merrin, E.L., Floyd, T.C., and Weiner, M.W.: Correlation between left frontal phospholipids and Wisconsin card sort test performance in schizophrenia. *Schizophrenia Research* 14:177-181, 1995. PMID: 7710998
213. Deicken, R.F., Calabrese, G., Merrin, E.L., Fein, G., and Weiner, M.W.: Basal ganglia phosphorous metabolism in chronic schizophrenia. *American Journal of Psychiatry* 152:126-129, 1995. PMID: 7802103
214. Baker, A.J., Brandes, R., and Weiner, M.W.: Effects of intracellular acidosis on calcium activation, contraction and relaxation of frog skeletal muscle. *Amer. J Physiol* 37:C55-C63, 1995.
215. Miller, R.G., Carson, P.J., Green, A., Baker, A., Moussavi, R.S., Boska, M.D., and Weiner, M.W.: Factors which influence alterations of phosphates and pH in exercising human skeletal muscle: Measurement error, reproducibility, and effects of fasting, carbohydrate loading, and metabolic acidosis. *Muscle and Nerve* 18:60-67, 1995. PMID: 7799999
216. Deicken, R.F., Weiner, M.W., and Fein, G.: Decreased temporal lobe phosphomonoesters in bipolar disorder. *Journal of Affective Disorders* 33:195-199, 1995. PMID: 779067
217. Deicken, R.F., Calabrese, G., Merrin, E.L., Vinogradov, S., Dillon, W.P., Fein, G., and Weiner, M.W.: Asymmetry of temporal lobe phosphorous metabolism in schizophrenia: A ³¹Phosphorous magnetic resonance spectroscopic imaging study. *Biological Psychiatry* 38:279-286, 1995. PMID: 7495921
218. Meyerhoff, D.J., MacKay, S., Saprey-Marinier, D., Deicken, R., Calabrese, G., Dillon, W.P., Weiner, M.W., and Fein, G.: Effects of chronic alcohol abuse and HIV infection on brain phosphorus metabolites. *Alcoholism: Clin. Exp. Res* 19:685-692, 1995. PMID: 7573794
219. Plesh, O., Meyerhoff, D.J., and Weiner, M.W.: Phosphorus magnetic resonance spectroscopy of human masseter muscle. *Journal of Dental Research* 74:338-344, 1995. PMID: 7876427

Curriculum Vitae - Michael W. Weiner, M.D.

220. Deicken, R.F., Fein, G., and Weiner, M.W.: Abnormal frontal lobe phosphorous metabolism in bipolar disorder. *American Journal of Psychiatry* 152:915-918, 1995. PMID: 7755123
221. Constans, J.M., Meyerhoff, D.J., Gerson, J., MacKay, S., Norman, D., Fein, G., and Weiner, M.W.: H-1 MR spectroscopic imaging of white matter signal hyperintensities: Alzheimer disease and ischemic vascular dementia. *Radiology* 197:517-523, 1995. PMC2780019
222. Constans, J.M., Meyerhoff, D.J., Norman, D., Fein, G., and Weiner, M.W.: 1H and 31P magnetic resonance spectroscopic imaging of white matter signal hyperintensities in elderly subjects. *Neuroradiology* 37:615-623, 1995. PMID: 8748891
223. Sharma, K.R., Kent-Braun, J.A., Mynhier, M., Weiner, M.W., and Miller, R.G.: Evidence of an abnormal intramuscular component of muscle fatigue in multiple sclerosis. *Muscle and Nerve* 18:1403-1411, 1995. PMC2733338
224. Mancuso, A., Karibe, H., Rooney, W.D., Zarow, G.J., Graham, S.H., Weiner, M.W., and Weinstein, P.R.: Correlation of early reduction in the apparent diffusion coefficient of water with blood flow reduction during middle cerebral artery occlusion in rats. *Magnetic Resonance in Medicine* 34:368-377, 1995. PMC2733355
225. Fein, G., Meyerhoff, D.J., and Weiner, M.W.: Magnetic resonance spectroscopy of the brain in alcohol abuse. *Alcohol Health & Research World* 19:306-314, 1995.
226. Di Sclafani, V., Ezekiel, F., Meyerhoff, D.J., MacKay, S., Dillon, W.P., Weiner, M.W., and Fein, G.: Brain atrophy and cognitive function in older abstinent alcoholic men. *Alcoholism: Clinical and Experimental Research* 19:1121-1126, 1995. PMC2780027
227. Sappey-Marinier, D., Chileuitt, L., Weiner, M.W., Faden, A.I., and Weinstein, P.R.: Hypoglycemia prevents increase in lactic acidosis during reperfusion after temporary cerebral ischemia in rats. *NMR in Biomedicine* 8:171-178, 1995. PMC2744691
228. Higuchi, T., Fernandez, E.J., Maudsley, A.A., Shimizu, H., Weiner, M.W., and Weinstein, P.R.: Mapping of Lactate and N-Acetyl-L-aspartate Predicts Infarction during Acute Focal Ischemia: In Vivo 1H Magnetic Resonance Spectroscopy in Rats. *Neurosurgery*, 38(1):121-130, 1996. PMID: 8747960
229. MacKay, S., Ezekiel, F., Di Sclafani, V., Meyerhoff, D.J., Gerson, J., Norman, D., Fein, G., and Weiner, M.W.: Alzheimer disease and subcortical ischemic vascular dementia: Evaluation by combining MR imaging segmentation and H-1 MR spectroscopic imaging. *Radiology* 198:537-545, 1996. PMC2733362
230. MacKay, S., Meyerhoff, D.J., Constans, J.M., Norman, D., Fein, G., and Weiner, M.W.: Regional gray and white matter metabolite differences in subjects with AD, with subcortical ischemic vascular dementia, and elderly controls with 1H magnetic resonance spectroscopic imaging. *Archives of Neurology* 53:167-174, 1996. PMC2733342

Curriculum Vitae - Michael W. Weiner, M.D.

231. Haupt, C.I., Schuff, N., Weiner, M.W., and Maudsley, A.A.: Removal of Lipid Artifacts in ^1H Spectroscopic Imaging by Data Extrapolation. *Magnetic Resonance in Medicine*, 35:678-687, 1996. PMC2733339
232. Meyerhoff, D.J., Weiner, M.W., and Fein, G.: Deep gray matter structures in HIV infection: A ^1H MR spectroscopic imaging study. *Amer. J. Neuroradiology* 17:973-978, 1996. PMC2733344
233. Kent-Braun, J.A., Sharma, K.R., Miller, R.G., and Weiner, M.W.: Effects of electrically stimulated exercise training on muscle function in multiple sclerosis. *J. Neurol. Rehab* 10:143-151, 1996.
234. Hugg, J.W., Maudsley, A.A., Weiner, M.W., and Matson, G.B.: Comparison of k-Space Sampling Schemes for Multidimensional MR Spectroscopic Imaging. *Magnetic Resonance in Medicine*, 36:469-473, 1996. PMID: 8875420
235. Chang, K.C., Schreur, J.H.M., Weiner, M.W., and Camacho, S.A.: Impaired Ca^{2+} handling is an early manifestation of pressure-overload hypertrophy in rat hearts. *Amer. J. Physiology* 271:H228-H234, 1996. PMID: 8760179
236. Meyerhoff, D.J., Rooney, W.D., Tokumitsu, T., and Weiner, M.W.: Evidence of multiple ethanol pools in the brain: An in-vivo proton magnetization transfer study. *Alcoholism: Clinical and Experimental Research* 20:1283-1287, 1996. PMID: 8904983
237. Ebisu, T., Rooney, W.D., Graham, S.H., Mancuso, A., Weiner, M.W., and Maudsley, A.A.: MR Spectroscopic Imaging and Diffusion-Weighted MRI for Early Detection of Kainate Induced Status Epilepticus in the Rat. *Magnetic Resonance in Medicine*, 36:821-828, 1996. PMID: 8946347
238. Rooney, W.D., Ebisu, T., Mancuso, A., Graham, S., Weiner, M.W., and Maudsley, A.A.: Metabolite ^1H relaxation in normal and hyponatremic brain. *Magnetic Resonance in Medicine* 35:688-696, 1996. PMC2733341
239. Meyerhoff, D.J., Weiner, M.W., and Fein, G.: Deep gray matter structures in HIV infection: ^1H MR spectroscopic imaging study. *American J Neuroradiology* 17:973-978, 1996. PMC2733344
240. Shames, D.M., Baker, A.J., Camacho, S.A., and Weiner, M.W.: The calcium-force relationship of frog skeletal muscle: A dynamic model for parameter estimation. *American Journal of Physiology* 271(6 Pt.1): C2062-2071, 1996. PMID: 8997209
241. Miyamae, M., Camacho, S.A., Weiner, M.W., and Figueiredo, V.M.: Attenuation of postischemic reperfusion injury is related to prevention of mitochondrial Ca^{2+} overload in rat hearts. *American Journal of Physiology* 271:H2145-H2153, 1996. PMID: 8945935

Curriculum Vitae - Michael W. Weiner, M.D.

242. Ende, G., Laxer, K.D., Knowlton, R.C., Matson, G.B., Schuff, N., Fein, G., and Weiner, M.W.: Temporal lobe epilepsy: Bilateral hippocampal metabolite changes revealed at proton MR spectroscopic imaging. *Radiology* 202:809-817, 1997. PMC2733359
243. Tokumitsu, T., Mancuso, A., Weinstein, P.R., Weiner, M.W., Naruse, S., and Maudsley, A.A.: Metabolic and pathological effects of temporal lobe epilepsy in rat brain detected by proton spectroscopy and imaging. *Brain Research*, 744:57-67, 1997. PMC2733350
244. Higuchi, T., Graham, S.H., Fernandez, E.J., Rooney, W.D., Gaspary, H.L., Weiner, M.W., and Maudsley, A.A.: Effects of Severe Global Ischemia on N-Acetylaspartate and other Metabolites in the Rat Brain. *Magnetic Resonance in Medicine*, 37:851-857, 1997. PMC2744638
245. Garcia, P.A., Laxer, K.D., Van der Grond, J., Hugg, J.W., Matson, G.B., and Weiner, M.W.: Correlation of seizure frequency with N-acetyl-aspartate levels determined by ¹H magnetic resonance spectroscopic imaging. *Magnetic Resonance Imaging* 15:475-478, 1997. PMID: 9223048
246. Rooney, W.D., Goodkin, D.E., Schuff, N., Meyerhoff, D.J., Norman, D., and Weiner, M.W.: ¹H MRSI of normal appearing white matter in multiple sclerosis. *Multiple Sclerosis* 3:231-237, 1997. PMID: 9372505
247. Deicken, R.F., Zhou, L., Corwin, F., Vinogradov, S., and Weiner, M.W.: Decreased left frontal lobe n-acetylaspartate in schizophrenia. *American Journal of Psychiatry* 154:688-690, 1997. PMID: 9137129
248. Tanabe, J.L., Amend, D., Schuff, N., Di Sclafani, V., Ezekiel, F., Norman, D., Fein, G., and Weiner, M.W.: Tissue segmentation of the brain in Alzheimer's disease. *American Journal of Neuroradiology* 18:115-123, 1997. PMID: 9010529
249. Schuff, N., Marmar, C.R., Weiss, D.S., Neylan, T.C., Schoenfeld, F., Fein, G., and Weiner, M.W.: Reduced Hippocampal Volume and N-Acetyl Aspartate in Posttraumatic Stress Disorder. In: *Annals of the New York Academy of Sciences. Supplement on Psychobiology of Posttraumatic Stress Disorders*, 821:516-520, 1997. PMID: 9238242
250. Miyamae, M., Diamond, I., Weiner, M.W., Camacho, S.A., and Figueiredo, V.M.: Regular alcohol consumption mimics cardiac preconditioning by protecting against ischemia-reperfusion injury. *Proc Nat Acad Sci*. 94:3235-3239, 1997. PMC20352
251. Cruz, C.J., Aminoff, M.J., Meyerhoff, D.J., Graham, S.H., and Weiner, M. W.: Proton MR spectroscopic imaging of the striatum in Parkinson's disease. *Magnetic Resonance Imaging* 15:619-624, 1997. PMID: 9285801

Curriculum Vitae - Michael W. Weiner, M.D.

252. DiSclafani, V., MacKay, S., Meyerhoff, D.J., Norman, D., Weiner, M.W., and Fein, G.: Brain atrophy in HIV infection is more strongly associated with CDC clinical stage than with cognitive impairment. *Journal of the International Neuropsychological Society* 3:276-287, 1997. PMC2709487
253. Tanabe, J., and Weiner, M.W.: MRI-MRS of the brain in systemic lupus erythematosus: How do we use it to understand causes of clinical signs? *Annals of the New York Academy of Science* 823:169-184, 1997. PMID: 9292043
254. Baker, A.J., and Weiner, M.W.: Force decline during muscle relaxation promotes calcium release to the cytosol. *American Journal of Physiology* 273(1 Pt 1):C85-C91, 1997. PMID: 9252445
255. Vermathen, P., Ende, G., Laxer, K.D., Knowlton, R.C., Matson, G.B., and Weiner, M.W.: Hippocampal N-Acetylaspartate in neocortical epilepsy and mesial temporal lobe epilepsy. *Annals of Neurology*, 42:194-9, 1997. PMC2744690
256. Miyamae, M., Camacho, S.A., Rooney, W.D., Modin, G., Zhou, H-Z, Weiner, M.W., and Figueredo, V.M.: Inorganic phosphate and coronary perfusion pressure mediate contractile dysfunction during mild ischemia. *American Journal of Physiology* 42:H566-H572, 1997. PMID: 9277470
257. Knowlton, R.C., Laxer, K.D., Ende, G., Hawkins, R.A., Wong, S.T.C., Matson, G.B., Rowley, H.A., Fein, G., and Weiner, M.W.: Presurgical multimodality neuroimaging in electroencephalographic lateralized temporal lobe epilepsy. *Annals of Neurology* 42:829-37, 1997. PMC2709486
258. Kent-Braun, J.A., Ng, A.V., Castro, M., Weiner, M.W., Dudley, G.A., and Miller, R.G.: Strength, skeletal muscle composition and enzyme activity in multiple sclerosis. *Journal of Applied Physiology* 83:1998-2004, 1997. PMID: 9390973
259. Govindaraju, V., Meyerhoff, D.J., Maudsley, A.A., Vermathen, M., and Weiner, M.W.: Effects of brain membranes on ¹H nuclear magnetic resonance signal intensity of ethanol in vitro. *Alcohol & Alcoholism*, 32(6):671-681, 1997. PMC2733340
260. Chang, K.C., Figueredo, V.M., Schreur, J.H.M., Kariya, K.I., Weiner, M.W., Simpson, P.C., and Camacho, S.A.: Thyroid hormone improves function and Ca²⁺ handling in pressure overload hypertrophy: Association with increased sarcoplasmic reticulum Ca²⁺-ATPase and α-myosin heavy chain in rat hearts. *J. Clin. Investigation* 100:1742-1749, 1997. PMC508357
261. Deicken, R.F., Zhou, L., Schuff, N., and Weiner, M.W.: Proton magnetic resonance spectroscopy of the anterior cingulate region in schizophrenia. *Schizophrenia Research* 27:65-71, 1997. PMID: 9373896

Curriculum Vitae - Michael W. Weiner, M.D.

262. Schuff, N., Amend, D., Ezekiel, F., Steinman, S.K., Tanabe, J., Norman, D., Jagust, W., Kramer, J.H., Mastrianni, J.A., Fein, G., and Weiner, M.W.: Changes of hippocampal N-acetyl aspartate and volume in Alzheimer's disease: A proton MR spectroscopic imaging and MRI study. *Neurology*, 49:1513-21, 1997. PMID: 9409338
263. Rooney, W.D., Miller, R.G., Gelinas, D., Schuff, N., Maudsley, A.A., and Weiner, M.W.: Decreased N-acetylaspartate in motor cortex and corticospinal tract in ALS. *Neurology*, 50:1800-5, 1998. PMID: 9633731
264. Deicken, R.F., Zhou, L., Schuff, N., Fein, G., and Weiner, M.W.: Hippocampal neuronal dysfunction in schizophrenia as measured by proton magnetic resonance spectroscopy. *Biological Psychiatry* 43:483-488, 1998. PMID: 9547926
265. Kiefer, A.P., Govindaraju, V., Matson, G.B., Weiner, M.W., and Maudsley, A.A.: Multiple-Echo Proton Spectroscopic Imaging Using Time Domain Parametric Spectral Analysis. *Magnetic Resonance in Medicine*, 39:528-538, 1998. PMC2780031
266. Schuff, N., Amend, D., Meyerhoff, D.J., Tanabe, J., Norman, D., Fein, G., and Weiner, M.W.: Alzheimer's disease: Quantitative H-1 MR spectroscopic imaging of fronto-parietal brain. *Radiology* 207:91-102, 1998. PMC2753252
267. Kent-Braun, J.A., Walker, C.H., Weiner, M.W., and Miller, R.G.: Functional significance of upper and lower motor neuron impairment in amyotrophic lateral sclerosis. *Muscle & Nerve* 21:762-768, 1998. PMID: 9585330
268. Van der Grond, J., Gerson, J.R., Laxer, K.D., Hugg, J.W., Matson, G.B., and Weiner, M.W.: Regional distribution of interictal ^{31}P metabolic changes in patients with temporal lobe epilepsy. *Epilepsia* 39:527-536, 1998. PMC2735262
269. Tanabe, J.L., Vermathen, M., Miller, R.G., Gelinas, D., Weiner, M.W., and Rooney, W.D.: Reduced MTR in the corticospinal tract and normal T2 in amyotrophic lateral sclerosis. *Magnetic Resonance Imaging*, 10:1163-1169, 1998. PMC2735261
270. Goodkin, D.E., Rooney, W.D., Sloan, R., Bacchetti, P., Gee, L., Vermathen, M., Waubant, E., Abundo, M., Majumdar, S., Nelson, S., and Weiner, M.W.: A serial study of new MS lesions and the white matter from which they arise. *Neurology*, 51:1689-1697, 1998. PMID: 9855524
271. Schuff, N., Vermathen, P., Maudsley, A.A., and Weiner, M.W.: Proton magnetic resonance spectroscopic imaging in neurodegenerative diseases. *Current Science*, 76(6):800-807, 1999.
272. Tanabe, J.L., Ezekiel, F., Jagust, W.J., Reed, B.R., Norman, D., Schuff, N., Weiner, M.W., Chui, H., and Fein, G.: Magnetization Transfer Ratio of White Matter Hyperintensities in Subcortical Ischemic Vascular Dementia. *American Journal of Neuroradiology*, 20(5):839-844, 1999. PMC1892905
<http://www.ncbi.nlm.nih.gov/pubmed/10369354>

Curriculum Vitae - Michael W. Weiner, M.D.

273. Kwan, L.T., Reed, B.R., Eberling, J.L., Schuff, N., Tanabe, J., Norman, D., Weiner, M.W., and Jagust, W.J.: Effects of Subcortical Cerebral Infarction on Cortical Glucose Metabolism and Cognitive Function. *Archives of Neurology*, 56:809-14, 1999. PMC2733358
274. Meyerhoff, D.J., Bloomer, C., Cardenas, V., Norman, D., Weiner, M.W., and Fein, G.: Elevated subcortical choline metabolites in cognitively and clinically asymptomatic HIV+ patients. *Neurology* 52:995-1003, 1999. PMID: 10102419
275. Schuff, N., Amend, D.L., Knowlton, R., Norman, D., Fein, G., and Weiner, M.W.: Age-related metabolite changes and volume loss in the hippocampus by magnetic resonance spectroscopy and imaging. *Neurobiology of Aging*, 20:279-85, 1999. PMC2733348
276. Meyerhoff, D.J., Bloomer, C., Schuff, N., Ezekiel, F., Norman, D., Clark, W., Weiner, M.W., and Fein, G.: Cortical metabolite alterations in abstinent cocaine and cocaine/alcohol-dependent subjects: proton magnetic resonance spectroscopic imaging. *Addiction Biology* 4:405-19, 1999. PMC2893339
277. Vermathen P, Laxer KD, Matson GB, Weiner MW: Hippocampal Structures: Anteroposterior N-acetylaspartate Differences in Patients with Epilepsy and Control Subjects as Shown with Proton MR Spectroscopic Imaging. *Radiology*, 214(2):403-10, 2000. PMID: 10671587
278. O'Neill J, Eberling JL, Schuff N, Jagust W, Reed B, Soto G, Ezekiel F, Klein G, and Weiner MW: Method to Correlate ¹H MRSI and ¹⁸FDG-PET. *Magnetic Resonance in Medicine* 43(2):244-50, 2000. PMC1993915
279. Capizzano AA, Schuff N, Amend DL, Tanabe JL, Norman D, Maudsley AA, Jagust W, Chui HC, Fein G, Segal MR, and Weiner MW: Subcortical Ischemic Vascular Dementia: Assessment with Quantitative MR Imaging and ¹H MR Spectroscopy. *American Journal of Neuroradiology*, 21(4):621-30, 2000. PMC1945115
280. Suhy J, Rooney WD, Goodkin DE, Capizano AA, Soher BJ, Maudsley AA, Waubant E, Andersson PB, and Weiner MW: ¹H MRSI comparison of white matter and lesions in primary progressive and relapsing-remitting MS. *Multiple Sclerosis*, 6(3):148-55, 2000. PMC2733351
281. Fein G, Di Sclafani V, Tanabe J, Cardenas V, Weiner MW, Jagust WJ, Reed BR, Norman D, Schuff N, Kusdra L, Greenfield T, Chui H: Hippocampal and Cortical Atrophy Predict Dementia in Subcortical Ischemic Vascular Disease. *Neurology*, 55(11):1626-35, 2000. PMC2733356
282. Reed BR, Eberling JL, Mungas D, Weiner MW, and Jagust WJ: Memory Failure has Different Mechanisms in Subcortical Stroke and Alzheimer's disease. *Ann Neurol*, 48(3):275-84, 2000. PMC1899248

Curriculum Vitae - Michael W. Weiner, M.D.

283. Soher BJ, Vermathen P, Schuff N, Wiedermann D, Meyerhoff DJ, Weiner MW, and Maudsley AA: [Short TE in vivo ¹H MR spectroscopic imaging at 1.5 T: acquisition and automated spectral analysis](#). Magnetic Resonance Imaging, 18(9):1159-65, 2000. PMID: 11118771
284. Schuff N, Rooney WD, Miller R, Gelinas DF, Amend DL, Maudsley AA, and Weiner MW: [Reanalysis of Multislice ¹H MRSI in Amyotrophic Lateral Sclerosis](#). Magnetic Resonance in Medicine, 45(3):513-16, 2001. PMID: 11241711
285. Weiner, M., DeCarli, C., deLeon, M., Fox, N., Jack C., Scheltens, P., Small, G., Khatchaturian, Z., Peterson, R., and Thal, L.: [Neuroimaging for detection, diagnosis and monitoring of Alzheimer's disease and other dementias: proceedings of the Alzheimer's Imaging Consortium](#). Neurobiology of Aging, 22(2):331-344, 2001.
286. Schuff N, Ezekiel F, Gamst AC, Amend DL, Capizzano AA, Maudsley AA, and Weiner MW: [Region and Tissue Differences of Metabolites in Normally Aged Brain Using Multislice ¹H Magnetic Resonance Spectroscopic Imaging](#). Magnetic Resonance in Medicine, 45(5):899-907, 2001. PMC1851682
287. Capizzano AA, Vermathen P, Laxer KD, Ende GR, Norman D, Rowley H, Matson GB, Maudsley AA, Segal MR, and Weiner MW: [Temporal Lobe Epilepsy: Qualitative Reading of ¹H MR Spectroscopic Images for Presurgical Evaluation](#). Radiology, 218(1):144-51, 2001. PMC2744695
288. Song, E, Cardenas, V, Ezekiel, F, Weiner, M.W. [Automatic Boundary Modification of Warped Basal Ganglia Template](#). Proceedings of SPIE, Vol. 4322, Medical Imaging 2001, San Diego, February 18-22, 2001.
289. Du AT, Schuff N, Amend D, Laakso MP, Hsu YY, Jagust WJ, Yaffe K, Kramer JH, Reed B, Norman D, Chui HC, Weiner MW: [Magnetic Resonance Imaging of the entorhinal cortex and hippocampus in mild cognitive impairment and Alzheimer's Disease](#). Journal of Neurology, Neurosurgery, and Psychiatry, 71(4):441-7, 2001. PMC1763497
290. Hsu YY, Du AT, Schuff N, Weiner MW: [Magnetic Resonance Imaging and Magnetic Resonance Spectroscopy in Dementias](#). Journal of Geriatric Psychiatry and Neurology 14(3):145-66, 2001. PMC1857299
291. Kramer JH, Reed BR, Mungas D, Weiner MW, and Chui HC: [Executive dysfunction in subcortical ischaemic vascular disease](#). Journal of Neurology, Neurosurgery, and Psychiatry, 72(2):217-20, 2002. PMC1737728
292. Suhy J, Miller RG, Rule R, Schuff N, Licht J, Dronsky V, Gelinas D, Maudsley AA, and Weiner MW: [Early detection and longitudinal changes in amyotrophic lateral sclerosis by ¹H MRSI](#). Neurology, 58(5):773-9, 2002. PMC2733360

Curriculum Vitae - Michael W. Weiner, M.D.

293. Schuff N, Neylan TC, Lenoci MA, Du AT, Weiss DS, Marmar CR, Weiner MW: [Decreased Hippocampal N-Acetylaspartate in the Absence of Atrophy in Posttraumatic Stress Disorder](#). Biological Psychiatry, 50(12):952-9, 2001. PMC2733624
294. Wiedermann D, Schuff N, Matson GB, Soher BJ, Du AT, Maudsley AA, and Weiner MW: [Short echo time multislice proton magnetic resonance spectroscopic imaging in human brain: metabolite distributions and reliability](#). Magnetic Resonance Imaging, 19(8):1073-80, 2001. PMID: 11711231
295. Mungas D, Jagust WJ, Reed BR, Kramer JH, Weiner MW, Schuff N, Norman D, Mack WJ, Willis L, Chui HC: [MRI Predictors of Cognition in Subcortical Ischemic Vascular Disease and Alzheimer's Disease](#). Neurology, 57(12):2229-35, 2001. PMC1862483
296. Mohr, D.C., Goodkin, D.E., Nelson, S., Cox, D., and Weiner, M.: [Moderating Effects of Coping on the Relationship Between Stress and the Development of New Brain Lesions in Multiple Sclerosis](#). Psychosomatic Medicine, 64:803-809, 2002. PMC1893006
297. Suhy J, Laxer KD, Capizzano AA, Vermathen P, Matson GB, Barbaro NM, Weiner MW: [1H MRSI Predicts Surgical Outcome in MRI-Negative Temporal Lobe Epilepsy](#). Neurology, 58(5):821-3, 2002. PMC2744686
298. Hsu YY, Schuff N, Amend DL, Du AT, Norman D, Chui HC, Jagust WJ, Weiner MW: [Quantitative Magnetic Resonance Imaging Differences Between Alzheimer Disease With and Without Subcortical Lacunes](#). Alzheimer Disease and Associated Disorders, 16(2):58-64, 2002. PMC1820852
299. Schuff N, Capizzano AA, Du AT, Amend DL, O'Neill J, Norman D, Kramer J, Jagust W, Miller B, Wolkowitz OM, Yaffe K, Weiner MW: [Selective Reduction of N-acetylaspartate in medial temporal and parietal lobes in AD](#). Neurology, 58(6):928-35, 2002. PMC1851674
300. O'Neill J, Schuff N, Marks WJ Jr, Feiwell R, Aminoff MJ, and Weiner MW: [Quantitative 1H Magnetic Resonance Spectroscopy and MRI of Parkinson's Disease](#). Movement Disorders, 17(5):917-27, 2002. PMID: 12360540
301. Vermathen P, Laxer KD, Schuff N, Matson GB, and Weiner MW: [Evidence of Neuronal Injury Outside the Medial Temporal Lobe in Temporal Lobe Epilepsy: N-Acetylaspartate Concentration Reductions Detected with Multisection Proton MR Spectroscopic Imaging – Initial Experience](#). Radiology, 226(1):195-202, 2003. PMC2753262
302. Rosen, H.J., Gorno-Tempini, M.L., Goldman, W.P., Perry, R.J., Schuff, N., Weiner, M., Feiwell, R., Kramer, J.H., Miller, B.L. [Patterns of brain atrophy in frontotemporal dementia and semantic dementia](#). Neurology 58(2):198-208, 2002. PMID: 11805245

Curriculum Vitae - Michael W. Weiner, M.D.

303. Capizzano AA, Vermathen P, Laxer KD, Matson GB, Maudsley AA, Soher BJ, Schuff NW, and Weiner MW: [Multisection Proton MR Spectroscopy for Mesial Temporal Lobe Epilepsy](#). American Journal of Neuroradiology, 23(8):1359-68, 2002. PMC2753243
304. Rosen, H.J., Kramer, J.H., Gorno-Tempini, M.L., Schuff, N., Weiner, M., Miller, B.L. [Patterns of cerebral atrophy in primary progressive aphasia](#). American Journal of Geriatric Psychiatry, 10(1):89-97, 2002. PMID: 11790639
305. Du AT, Schuff N, Laakso MP, Zhu XP, Jagust WJ, Yaffe K, Kramer JH, Miller BL, Reed BR, Norman D, Chui HC, and Weiner MW: [Effects of subcortical ischemic vascular dementia and AD on entorhinal cortex and hippocampus](#). Neurology, 58(11):1635-41, 2002. PMC1820858
306. Vermathen P, Ende G, Laxer KD, Walker JA, Knowlton RC, Barbaro NM, Matson GB, and Weiner MW: [Temporal lobectomy for epilepsy: Recovery of the contralateral hippocampus measured by ¹H MRS](#). Neurology, 59(4):633-6, 2002. PMC2753242
307. Cardenas VA, Du AT, Hardin D, Ezekiel F, Weber P, Jagust WJ, Chui HC, Schuff N, Weiner MW: [Comparison of methods for measuring longitudinal brain change in cognitive impairment and dementia](#). Neurobiology of Aging, 24(4):537-44, 2003. PMID: 12714110
308. Hsu YY, Schuff N, Du AT, Mark K, Zhu X, Hardin D, and Weiner MW: [Comparison of Automated and Manual MRI Volumetry of Hippocampus in Normal Aging and Dementia](#). Journal of Magnetic Resonance Imaging, 16(3):305-10, 2002. PMC1851676
309. Rosen, H.J., Perry, R.J., Murphy, J., Kramer, J.H., Mychack, P., Schuff, N., Weiner, M., Levenson, R.W., and Miller, B.L.: [Emotion comprehension in the temporal variant of frontotemporal dementia](#). Brain, 125(10): 2286-95, 2002. PMID: 12244085
310. Mueller SG, Suhy J, Laxer KD, Flenniken DL, Axelrad J, Capizzano AA, Weiner MW: [Reduced Extrahippocampal NAA in Mesial Temporal Lobe Epilepsy](#). Epilepsia, 43(10):1210-6, 2002. PMC2753247
311. Mungas D, Reed BR, Jagust WJ, DeCarli C, Mack WJ, Kramer JH, Weiner MW, Schuff N, Chui HC: [Volumetric MRI predicts rate of cognitive decline related to AD and cerebrovascular disease](#). Neurology, 59(6):867-73, 2002. PMC1820873
312. Du AT, Schuff N, Zhu XP, Jagust WJ, Miller BL, Reed BR, Kramer JH, Mungas D, Yaffe K, Chui HC, and Weiner MW: [Atrophy rates of entorhinal cortex in AD and normal aging](#). Neurology, 60(3):481-6, 2003. PMC1851672
313. Neylan TC, Schuff N, Lenoci M, Yehuda R, Weiner MW, and Marmar CR: [Cortisol Levels are Positively Correlated with Hippocampal N-Acetylaspartate](#). Biological Psychiatry, 54(10):1118-21, 2003. PMC2733352

Curriculum Vitae - Michael W. Weiner, M.D.

314. Boxer, A.L., Rankin, K.P., Miller, B.L., Schuff, N., Weiner, M.W., Gorno-Tempini, M-L., and Rosen, H.J.: [Cinguloparietal atrophy distinguishes Alzheimer's disease from semantic dementia](#). Archives of Neurology, 60: 949-956, 2003. PMID: 12873851
315. Jahng GH, Zhu XP, Matson GB, Weiner MW, Schuff N: [Improved Perfusion-Weighted MRI by a Novel Double Inversion With Proximal Labeling of Both Tagged and Control Acquisitions](#). Magnetic Resonance In Medicine, 49(2):307-14, 2003. PMC1851685
316. Chao LL, Meyerhoff DJ, Cardenas VA, Rothlind JC, Weiner MW.: [Abnormal CNV in chronic heavy drinkers](#). Clin Neurophysiol, 114(11): 2081-95, 2003. PMID: 14580606
317. Schuff N, Capizzano AA, Du AT, Amend DL, O'Neill J, Norman D, Jagust WJ, Chui HC, Kramer JH, Reed BR, Miller BL, Yaffe K, and Weiner MW: [Different Patterns of N-acetylaspartate Loss in Subcortical Ischemic Vascular Dementia and AD](#). Neurology, 61(3):358-64, 2003. PMC1820863
318. Mueller SG, Laxer KD, Suhy J, Lopez RC, Flenniken DL, and Weiner MW: [Spectroscopic Metabolic Abnormalities in mTLE With and Without MRI Evidence for Mesial Temporal Sclerosis Using Hippocampal Short-TE MRSI](#). Epilepsia, 44(7):977-80, 2003. PMC2744693
319. Chao LL, Cardenas VA, Meyerhoff DJ, Rothlind JC, Flenniken DL, Lindgren JA and Weiner MW: [Abnormal Contingent Negative Variation in HIV Patients Receiving Antiretroviral Therapy](#). NeuroReport, 14(16): 2111-5, 2003. PMC2733942
320. Chao, L.L., Meyerhoff, D.J., Lindgren, J.A., and Weiner, M.W.: [The Effects of Chronic Alcohol use on Implicit Memory and Decision-Making Abilities](#). Clinical Neurophysiology, 114(11): 2081-95, 2003. PMID: 14580606
321. Boxer AL, Kramer JH, Du AT Schuff N, Weiner MW, Miller BL, Rosen HJ.: [Focal right inferotemporal atrophy in AD with disproportionate visual constructive impairment](#). Neurology, 61(11): 1485-91, 2003. PMC2744649
322. Zhu XP, Du AT, Jahng GH, Soher BJ, Maudsley AA, Weiner MW, Schuff N: [Magnetic Resonance Spectroscopic Imaging Reconstruction with Deformable Shape-Intensity Models](#). Magnetic Resonance in Medicine, 50(3): 474-82, 2003. PMC1851686
323. Studholme, C., Cardenas, V., Maudsley, A., Weiner, M.: [An intensity consistent filtering approach to the analysis of deformation tensor derived maps of brain shape](#). Neuroimage, 19(4); 1638-49, 2003. PMID: 12948718
324. Du AT, Schuff N, Kramer JH, Ganzer S, Zhu XP, Jagust WJ, Miller BL, Reed BR, Mungas D, Yaffe K, Chui HC, and Weiner MW: [Higher Atrophy Rate of Entorhinal Cortex than Hippocampus in AD](#). Neurology, 62(3):422-7, 2004. PMC1820859

Curriculum Vitae - Michael W. Weiner, M.D.

325. Liu, W., Miller, B.L., Kramer, J.H., Rankin, K., Wyss-Coray, C., Gearhart, R., Phengrasamy, L., Weiner, M., Rosen, H.J.: [Behavioral disorders in the frontal and temporal variants of frontotemporal dementia](#). Neurology, 62(5): 742-748, 2004. PMC2367136
326. Weiner, M.W., Albert, M.S., DeCarli, C.S., de Leon, M., Fox, N.C., Jack, C.R., Jr., Jagust, W.J., Reiman, E.M., Scheltens, P., Small, G.W., Soininen, H. and Wahlund, L-O.: [Proceedings and Abstracts Second Meeting of the Alzheimer's Imaging Consortium Stockholm Fairgrounds, Stockholm, Sweden, July 20, 2002](#). Neurobiology of Aging, 25: 239-270, 2004. PMID: 14749142
327. Neylan TC, Lenoci M, Rothlind J, Metzler TJ, Schuff N, Du AT, Franklin KW, Weiss DS, Weiner MW, Marmar CR: [Attention, Learning and Memory in Posttraumatic Stress Disorder](#). Journal of Traumatic Stress, 17(1):41-6, 2004. PMC2366105
328. Studholme, C., Cardenas, V., Song, E., Ezekiel, F., Maudsley, A., Weiner, M.: [Accurate Template-Based Correction of Brain MRI Intensity Distortion With Application to Dementia and Aging](#). IEEE Transactions on Medical Imaging, 23(1): 99-110, 2004. PMC2291516
329. DeCarli, C., Mungas, D., Harvey, D., Reed, B., Weiner, M., Chui, H., Jagust, W.: [Memory Impairment, but not Cerebrovascular disease predicts progression of MCI to Dementia](#). Neurology, 63(2), 220-227, 2004. PMC1820872
330. Kramer JH, Schuff N, Reed BR, Mungas D, Du AT, Rosen HJ, Jagust WJ, Miller BL, Weiner MW, Chui HC: [Hippocampal Volume and Retention in Alzheimer's Disease](#). Journal of International Neuropsychological Society, 10(4):639-43, 2004. PMC1820856
331. Meyerhoff DJ, Blumenfeld R, Truran D, Lindgren J, Flenniken D, Cardenas V, Chao LL, Rothlind J, Studholme C, Weiner MW: [Effects of heavy drinking, binge drinking, and family history of alcoholism on regional brain metabolites](#). Alcoholism Clin Exp Res, 28(4):650-61, 2004. PMC2365749
332. Reed, B.R., Eberling, J.L., Mungas, D., Weiner, M., Kramer, J.H., Jagust, W.J. [Effects of white matter lesions and lacunes on cortical function](#). Archives of Neurology, 61(10), 1545-50, 2004. PMID: 15477508
333. Chao LL, Lindgren JA, Flenniken DL, and Weiner MW: [ERP evidence of impaired central nervous system function in virally suppressed HIV patients on antiretroviral therapy](#). Clinical Neurophysiology, 115(7):1583-91, 2004. PMC2367143
334. Tullberg M, Fletcher E, DeCarli C, Mungas D, Reed BR, Harvey DJ, Weiner MW, Chui HC, Jagust WJ: [White matter lesions impair frontal lobe function regardless of their location](#). Neurology, 63(2):246-53, 2004. PMC1893004

Curriculum Vitae - Michael W. Weiner, M.D.

335. Mueller SG, Laxer KD, Cashdollar N, Flenniken DL, Matson GB, Weiner MW: [Identification of Abnormal Neuronal Metabolism Outside the Seizure Focus in Temporal Lobe Epilepsy](#). *Epilepsia*, 45(4):355-66, 2004. PMC2744694
336. Studholme, C., Cardenas, V., Blumenfeld, R., Schuff, N., Rosen, H.J., Miller, B., Weiner, W.: [Deformation tensor morphometry of semantic dementia with quantitative validation](#), *Neuroimage*, 21(4): 1387-98, 2004. PMID: 15050564
337. Wilhelmsen KC, Forman MS, Rosen HJ, Alving LI, Goldman J, Feiger J, Lee JV, Segall SK, Kramer JH, Lomen-Hoerth C, Rankin KP, Johnson J, Feiler HS, Weiner MW, Lee VM, Trojanowski JQ, Miller BL: [17q-Linked Frontotemporal Dementia-Amyotrophic Lateral Sclerosis Without Tau Mutations With Tau and Alpha-Synuclein Inclusions](#). *Arch Neurol*, 61(3):398-406, 2004. PMID: 15023818
338. Rankin KP, Rosen HJ, Kramer JH, Schauer GF, Weiner MW, Schuff N, Miller BL: [Right and left medial orbitofrontal volumes show an opposite relationship to agreeableness in FTD](#). *Dement Geriatr Cogn Disord*, 17(4):328-32, 2004. PMC2362501
339. Gorno-Tempini ML, Murray RC, Rankin KP, Weiner MW, Miller BL. [Clinical, cognitive and anatomical evolution from nonfluent progressive aphasia to corticobasal syndrome: a case report](#). *Neurocase*, 10(6):426-36, 2004. PMC2365737
340. Gorno-Tempini ML, Dronkers NF, Rankin KP, Ogar JM, Phengrasamy L, Rosen HJ, Johnson JK, Weiner MW, Miller BL: [Cognition and anatomy in three variants of primary progressive aphasia](#). *Ann Neurol*, 55(3):335-346, 2004. PMC2362399
341. Kramer JH, Mungas D, Reed BR, Schuff N, Weiner MW, Miller BL, Chui HC: [Forgetting in dementia with and without subcortical lacunes](#). *Clin Neuropsychol*, 18(1):32-40, 2004. PMC1820864
342. Mueller SG, Laxer KD, Barakos JA, Cashdollar N, Flenniken DL, Vermathen P, Matson GB, Weiner MW: [Identification of the epileptogenic lobe in neocortical epilepsy with proton MR spectroscopic imaging](#). *Epilepsia*, 45(12):1580-9, 2004. PMC274468
343. Ezekiel, F., Chao, L.L., Kornak, J., Du, A.T., Cardenas, V.A., Truran, D.L., Jagust, W.J., Chui, H.C., Miller, B.L., Yaffe, K., Schuff, N., Weiner, M.W.: [Comparisons Between Global and Focal brain Atrophy rates in Normal Aging and Alzheimer's Disease: Boundary Shift Integral versus Tracing of the Entorhinal Cortex and Hippocampus](#). *Alzheimer Disease and Associated Disorders*, 18(4), 196-201, 2004. PMC1820853
344. Rule RR, Suhy J, Schuff N, Gelinas DF, Miller RG, and Weiner MW: [Reduced NAA in motor and non-motor brain regions in Amyotrophic Lateral Sclerosis: A cross-sectional and longitudinal study](#). *Amyotrophic Lateral Sclerosis and other Motor Neuron Disorders*, 5(3):141-9, 2004. PMC2744639

Curriculum Vitae - Michael W. Weiner, M.D.

345. Johnson NA, Jahng GH, Weiner MW, Miller BL, Chui HC, Jagust WJ, Gorno-Tempini ML, Schuff N: [Pattern of Cerebral Hypoperfusion in Alzheimer Disease and Mild Cognitive Impairment Measured With Arterial Spin-Labeling MR Imaging: Initial Experience.](#) Radiology, 234(3): 851-9, 2005. PMC1851934
346. Chao LL, Schuff N, Kramer JH, Du AT, Capizzano AA, O'Neill J, Wolkowitz OM, Jagust WJ, Chui HC, Miller BL, Yaffe K, Weiner MW: [Reduced medial temporal lobe N-acetylaspartate in cognitively impaired not demented individuals.](#) Neurology, 64(2):282-9, 2005. PMC1851679
347. Li KL, Zhu X, Hylton N, Jahng GH, Weiner MW, Schuff N: [Four-Phase Single-Capillary Stepwise Model for Kinetics in Arterial Spin Labeling MRI.](#) Magnetic Resonance in Medicine 53(3): 511-8, 2005. PMC1941668
348. Du AT, Schuff N, Chao LL, Kornak J, Ezekiel F, Jagust WJ, Kramer JH, Reed BR, Miller BL, Norman D, Chui HC, Weiner MW: [White matter lesions are associated with cortical atrophy more than entorhinal and hippocampal atrophy.](#) Neurobiology of Aging, 26(4):553-559, 2005. PMID: 15653183
349. Kaiser LG, Schuff N, Cashdollar N, Weiner MW: [Age-related glutamate and glutamine concentration changes in normal human brain: 1H MR spectroscopy study at 4 T.](#) Neurobiology of Aging, 26(5):665-72, 2005. PMC2443746
350. Rothlind JC, Greenfield TM, Bruce AV, Meyerhoff DJ, Flenniken DL, Lindgren JA, Weiner MW.: [Heavy alcohol consumption in individuals with HIV infection: effects on neuropsychological performance.](#) J Int Neuropsychol Soc, 11(1):70-83, 2005. PMC2376753
351. Mueller SG, Laxer KD, Barakos JA, Cashdollar N, Flenniken DL, Vermathen P, Matson GB, and Weiner MW: [Metabolic Characteristics of Cortical Malformations Causing Epilepsy.](#) Journal of Neurology, 252(9):1082-92, 2005. PMC2709485
352. Cardenas VA, Studholme C, Meyerhoff DJ, Song E, and Weiner MW: [Chronic active heavy drinking and family history of problem drinking modulate regional brain tissue volumes.](#) Psychiatry Research, 138(2):115-30, 2005. PMID: 15766635
353. Kaiser LG, Schuff N, Cashdollar N, Weiner MW.: [Scyllo-inositol in normal aging human brain: 1H magnetic resonance spectroscopy study at 4 Tesla.](#) NMR Biomed, 18(1):51-55, 2005. PMC1820854
354. Cardenas VA, Chao LL, Blumenfeld R, Song E, Meyerhoff DJ, Weiner MW, Studholme C.: [Using automated morphometry to detect associations between ERP latency and structural brain MRI in normal adults.](#) Hum Brain Mapp, 25(3):317-27, 2005. PMC2443725

Curriculum Vitae - Michael W. Weiner, M.D.

355. Seeley WW, Bauer AM, Miller BL, Gorno-Tempini ML, Kramer JH, Weiner M, Rosen HJ.: [The natural history of temporal variant frontotemporal dementia](#), Neurology 64, 1384-1390, 2005. PMC2376750
356. Ebel A, Maudsley AA, Weiner MW, Schuff N. [Achieving sufficient spectral bandwidth for volumetric 1H echo-planar spectroscopic imaging at 4 Tesla](#). Magnetic Resonance in Medicine, 54(3):697-701, 2005. PMC1851680
357. Zarow C, Vinters HV, Ellis WG, Weiner MW, Mungas D, White L, Chui HC.: [Correlates of hippocampal neuron number in Alzheimer's disease and ischemic vascular dementia](#). Ann Neurol, 57(6):896-903, 2005. PMC1851673
358. Jahng GH, Stables L, Ebel A, Matson GB, Meyerhoff DJ, Weiner MW, Schuff N.: [Sensitive and fast T1 mapping based on two inversion recovery images and a reference image](#). Med Phys, 32(6):1524-8, 2005. PMC2443728
359. Mueller SG, Weiner MW, Thal LJ, Petersen RC, Jack CR, Jagust W, Trojanowski JQ, Toga AW, Beckett L.: [Ways toward an early diagnosis in Alzheimer's disease: The Alzheimer's Disease Neuroimaging Initiative \(ADNI\)](#), Alzheimer's & Dementia 1:55-66, 2005. PMC1864941
360. Weiner MW. [Commentary on "Diagnosis of Alzheimer's disease: Two decades of progress." Central role of technology in the treatment and prevention of Alzheimer's disease](#). Alzheimer's & Dementia, 1(2):112-3, 2005. PMC1820886
361. Rosen HJ, Allison SC, Schauer GF, Gorno-Tempini ML, Weiner MW, Miller BL.: [Neuroanatomical correlates of behavioural disorders in dementia](#). Brain, 128(Pt 11):2612-25, 2005. PMC1820861
362. Kramer JH, Rosen HJ, Du AT, Schuff N, Hollnagel C, Weiner MW, Miller BL, Delis DC. [Dissociations in hippocampal and frontal contributions to episodic memory performance](#). Neuropsychology, 19(6):799-805, 2005. PMC1851935
363. Weiner MW: [Magnetic resonance imaging of dementia](#). Top Magn Reson Imaging, 16(6):397-8. 2005. PMC1862482
364. Mungas D, Harvey D, Reed BR, Jagust WJ, DeCarli C, Beckett L, Mack WJ, Kramer JH, Weiner MW, Schuff N, Chui HC.: [Longitudinal volumetric MRI change and rate of cognitive decline](#). Neurology, 65(4):565-71, 2005. PMC1820871
365. Jahng GH, Song E, Zhu XP, Matson GB, Weiner MW, Schuff N.: [Human brain: reliability and reproducibility of pulsed arterial spin-labeling perfusion MR imaging](#). Radiology, 234(3):909-16, 2005. PMC1851681

Curriculum Vitae - Michael W. Weiner, M.D.

366. Mueller SG, Weiner MW, Thal LJ, Petersen RC, Jack C, Jagust W, Trojanowski JQ, Toga AW, Beckett L.: [The Alzheimer's Disease Neuroimaging Initiative](#). Neuroimag Clin N Am, 15(4):869-77, 2005. PMC2376747
367. Hayasaka S, Du AT, Duarte A, Kornak J, Jahng G-H, Weiner MW, Schuff N. [A non-parametric approach for co-analysis of multi-modal brain imaging data: Application to Alzheimer's disease](#). NeuroImage, 30(3):768-79, 2006. PMC1838962
368. Boxer AL, Geschwind MD, Belfor N, Gorno-Tempini ML, Schauer GF, Miller BL, Weiner MW, Rosen HJ: [Patterns of Brain Atrophy That Differentiate Corticobasal Degeneration Syndrome From Progressive Supranuclear Palsy](#). Arch Neurol, 63(1):81-6, 2006. PMID: 16401739
369. Thal LJ, Kantarci K, Reiman EM, Klunk WE, Weiner MW, Zetterberg H, Galasko D, Pratico D, Griffin S, Schenk D, Siemers E. [The Role of Biomarkers in Clinical Trials for Alzheimer Disease](#). Alzheimer Dis Assoc Disord, 20(1):6-15, 2006. PMC1820855
370. Du AT, Schuff N, Chao LL, Kornak J, Jagust WJ, Kramer JH, Reed BR, Miller BL, Norman D, Chui HC, Weiner MW.: [Age effects on atrophy rates of entorhinal cortex and hippocampus](#). Neurobiol Aging, 27(5):733-40, 2006. PMC1779763
371. Leow AD, Klunder AD, Jack CR Jr, Toga AW, Dale AM, Bernstein MA, Britson PJ, Gunter JL, Ward CP, Whitwell JL, Borowski BJ, Fleisher AS, Fox NC, Harvey D, Kornak J, Schuff N, Studholme C, Alexander GE, Weiner MW, Thompson PM; [ADNI Preparatory Phase Study: Longitudinal stability of MRI for mapping brain change using tensor-based morphometry](#). Neuroimage, 31(2):627-40, 2006. PMC1941663
372. Mueller SG, Laxer KD, Cashdollar N, Buckley S, Paul C, Weiner MW.: [Voxel-based Optimized Morphometry \(VBM\) of Gray and White Matter in Temporal Lobe Epilepsy \(TLE\) with and without Mesial Temporal Sclerosis](#). Epilepsia, 47(5):900-7, 2006. PMC2744650
373. Zhu XP, Young K, Ebel A, Soher BJ, Kaiser L, Matson G, Weiner MW, Schuff N.: [Robust Analysis of Short Echo Time 1H MRSI of Human Brain](#). Magnetic Resonance in Medicine, 55(3):706-11, 2006. PMC1838963
374. Mueller SG, Laxer KD, Cashdollar N, Lopez RC, Weiner MW: [Spectroscopic evidence of hippocampal abnormalities in neocortical epilepsy](#). Eur J Neurol, 13(3): 256-60, 2006. PMC2744644
375. Rankin KP, Gorno-Tempini ML, Allison SC, Stanley CM, Glenn S, Weiner MW, Miller BL.: [Structural anatomy of empathy in neurodegenerative disease](#). Brain, 129(Pt 11):2945-56, 2006. PMC2562652

Curriculum Vitae - Michael W. Weiner, M.D.

376. Schuff N, Meyerhoff DJ, Mueller S, Chao L, Sacrey DT, Laxer K, Weiner MW. [N-acetylaspartate as a marker of neuronal injury in neurodegenerative disease](#). Adv Exp Med Biol, 576:241-62, 2006. PMC1779762
377. Iordanova B, Rosenbaum D, Norman D, Weiner M, Studholme C. [MR Imaging Anatomy in Neurodegeneration: A Robust Volumetric Parcellation Method of the Frontal Lobe Gyri with Quantitative Validation in Patients with Dementia](#). AJNR Am J Neuroradiol, 27(8):1747-54, 2006. PMC1829312
378. Chui HC, Zarow C, Mack WJ, Ellis WG, Zheng L, Jagust WJ, Mungas D, Reed BR, Kramer JH, DeCarli CC, Weiner MW, Vinters HV.: [Cognitive Impact of Subcortical Vascular and Alzheimer's Disease Pathology](#). Annals of Neurology, 60(6):677-87, 2006. PMC1851933
379. Duarte A, Hayasaka S, Du A, Schuff N, Jahng GH, Kramer J, Miller B, Weiner M. [Volumetric correlates of memory and executive function in normal elderly, mild cognitive impairment and Alzheimer's disease](#). Neuroscience Letters, 406(1-2):60-5, 2006. PMC1779764
380. Du AT, Jahng GH, Hayasaka S, Kramer JH, Rosen HJ, Gorno-Tempini ML, Rankin KP, Miller BL, Weiner MW, Schuff N. [Hypoperfusion in frontotemporal dementia and Alzheimer disease by arterial spin labeling MRI](#). Neurology, 67(7):1215-20, 2006. PMC1779761
381. Mueller SG, Weiner MW, Thal LJ, Petersen RC, Jack C, Jagust W, Trojanowski JQ, Toga AW, Beckett LA. [Ways toward an early diagnosis in Alzheimer's disease: The Alzheimer's Disease Neuroimaging Initiative](#). Cognition and Dementia, 5(4):56-62, 2006. PMC1864941
382. Zhu X, Schuff N, Kornak J, Soher B, Yaffe K, Kramer JH, Ezekiel F, Miller BL, Jagust WJ, Weiner MW: [Effects of Alzheimer disease on fronto-parietal brain N-acetyl aspartate and myo-inositol using magnetic resonance spectroscopic imaging](#). Alzheimer Dis Assoc Disord, 20(2):77-85, 2006. PMC1820860
383. Samuelson KW, Neylan TC, Metzler TJ, Lenoci M, Rothlind J, Henn-Haase C, Choucroun G, Weiner MW, Marmar CR.: [Neuropsychological functioning in posttraumatic stress disorder and alcohol abuse](#). Neuropsychology, 20(6):716-26, 2006. PMC2443729
384. Mueller SG, Schuff N, Weiner MW.: [Evaluation of treatment effects in Alzheimer's and other neurodegenerative diseases by MRI and MRS](#). NMR Biomed, 19(6):655-68, 2006. PMC1820857
385. Durazzo TC, Cardenas VA, Studholme C, Weiner MW, Meyerhoff DJ.: [Non-treatment-seeking heavy drinkers: Effects of chronic cigarette smoking on brain structure](#). Drug Alcohol Depend, 87(1):76-82, 2007. PMC2443734
386. Zhang Y, Schuff N, Jahng G-H, Bayne W, Mori S, Schad L, Mueller S, Du A-T, Kramer JH, Yaffe K, Chui H, Jagust WJ, Miller BL, Weiner MW.: [Diffusion tensor imaging of cingulum](#)

Curriculum Vitae - Michael W. Weiner, M.D.

- [fibers in mild cognitive impairment and Alzheimer disease](#). Neurology, 68(1):13-9, 2007.
PMC1941719
387. Hadjidemetriou S, Studholme C, Mueller S, Weiner M, Schuff N.: [Restoration of MRI Data for Field Nonuniformities using High Order Neighborhood Statistics](#). Proc Soc Photo Opt Instrum Eng, 6512:65121L, 2007. PMC2194598
388. Kramer JH, Mungas D, Reed BR, Wetzel ME, Burnett MM, Miller BL, Weiner MW, Chui HC.: [Longitudinal MRI and Cognitive Change in Healthy Elderly](#). Neuropsychology, 21(4):412-8, 2007. PMC2780018
389. Raj A, Singh G, Zabih R, Kressler B, Wang Y, Schuff N, Weiner M. [Bayesian Parallel Imaging with Edge-Preserving Priors](#). Magnetic Resonance in Medicine, 57(1): 8-21, 2007.
PMC2291515
390. Mueller SG, Stables L, Du AT, Schuff N, Truran D, Cashdollar N, Weiner MW. [Measurement of hippocampal subfields and age-related changes with high resolution MRI at 4T](#). Neurobiol Aging, 28(5):719-26, 2007. PMC1820772
391. Du AT, Schuff N, Kramer JH, Rosen HJ, Gorno-Tempini ML, Rankin K, Miller BL, Weiner MW. [Different regional patterns of cortical thinning in Alzheimer's disease and frontotemporal dementia](#). Brain, 130(Pt 4):1159-66, 2007. PMC1853284
392. O'Hara R, Schroder CM, Mahadevan R, Schatzberg AF, Lindley S, Fox S, Weiner M, Kraemer HC, Noda A, Lin X, Gray HL, Hallmayer JF.: [Serotonin Transporter Polymorphism, Memory, and Hippocampal Volume in the Elderly: Association and Interaction with Cortisol](#). Molecular Psychiatry, 12(6):544-55, 2007. PMC2084475
393. Kramer JH, Qutmania L, Dean D, Neuhaus J, Rosen HJ, Halabi C, Weiner MW, Magnotta VA, Delis DC, Miller BL.: [Magnetic resonance imaging correlates of set shifting](#). J Int Neuropsychol Soc, 13(3):386-92, 2007. PMC2443737
394. Brambati SM, Renda NC, Rankin KP, Rosen HJ, Seeley WW, Ashburner J, Weiner MW, Miller BL, Gorno-Tempini ML.: [A tensor based morphometry study of longitudinal gray matter contraction in FTD](#). Neuroimage, 35(3):998-1003, 2007. PMC2443736
395. Mueller SG, Laxer KD, Schuff N, Weiner MW.: [Voxel-based T2 relaxation rate measurements in temporal lobe epilepsy \(TLE\) with and without mesial temporal sclerosis](#). Epilepsia, 48(2):220-8, 2007. PMC2744642
396. Werner KH, Roberts NA, Rosen HJ, Dean DL, Kramer JH, Weiner MW, Miller BL, Levenson RW. [Emotional reactivity and emotion recognition in frontotemporal lobar degeneration](#). Neurology, 69(2):148-55, 2007. PMC2562666

Curriculum Vitae - Michael W. Weiner, M.D.

397. Cardenas VA, Boxer AL, Chao LL, Gorno-Tempini ML, Miller BL, Weiner MW, Studholme C. [Deformation-based morphometry reveals brain atrophy in frontotemporal dementia](#). Arch Neurol, 64(6):873-7, 2007. PMC2733361
398. Yonelinas AP, Widaman K, Mungas D, Reed B, Weiner MW, Chui HC.: [Memory in the aging brain: Doubly dissociating the contribution of the hippocampus and entorhinal cortex](#). Hippocampus, 17(11): 1134-40, 2007. PMC2194291
399. Kim EJ, Rabinovici GD, Seeley WW, Halabi C, Shu H, Weiner MW, Dearmond SJ, Trojanowski JQ, Gorno-Tempini ML, Miller BL, Rosen HJ. [Patterns of MRI atrophy in tau-positive and ubiquitin-positive frontotemporal lobar degeneration](#). J Neurol Neurosurg Psychiatry, 78(12): 1375-8, 2007. PMC2095621
400. Durazzo TC, Rothlind JC, Cardenas VA, Studholme C, Weiner MW, Meyerhoff DJ. [Chronic cigarette smoking and heavy drinking in human immunodeficiency virus: consequences for neurocognition and brain morphology](#). Alcohol, 41(7): 489-501, 2007. PMC2443733
401. Chao LL, Schuff N, Clevenger EM, Mueller SG, Rosen HJ, Gorno-Tempini ML, Kramer JH, Miller BL, Weiner MW. [Patterns of white matter atrophy in frontotemporal lobar degeneration](#). Arch Neurol, 64(11): 1619-24, 2007. PMC2443735
402. Rabinovici GD, Seeley WW, Kim EJ, Gorno-Tempini ML, Rascovsky K, Pagliaro TA, Allison SC, Halabi C, Kramer JH, Johnson JK, Weiner MW, Forman MS, Trojanowski JQ, Dearmond SJ, Miller BL, Rosen HJ.: [Distinct MRI atrophy patterns in autopsy-proven Alzheimer's disease and Frontotemporal lobar degeneration](#). Am J Alzheimers Dis Other Demen, 22(6):474-88, 2007. PMC2443731
403. Jahng GH, Weiner MW, Schuff N.: [Improved arterial spin labeling method: applications for measurements of cerebral blood flow in human brain at high magnetic field MRI](#). Med Phys, 34(11):4519-25, 2007. PMC2443744
404. Boyes RG, Gunter JL, Frost C, Janke AL, Yeatman T, Hill DL, Bernstein MA, Thompson PM, Weiner MW, Schuff N, Alexander GE, Killiany RJ, Decarli C, Jack CR, Fox NC, for the ADNI study.: [Intensity non-uniformity corrections using N3 on 3-T scanners with multichannel phased array coils](#). Neuroimage, 39(4):1752-62, 2008. PMC2562663
405. Carey CL, Kramer JH, Josephson SA, Mungas D, Reed BR, Schuff N, Weiner MW, Chui HC.: [Subcortical Lacunes are Associated with Executive Dysfunction in Cognitively Normal Elderly](#). Stroke, 39(2): 397-402, 2008. PMC2443738
406. Gazdzinski S, Durazzo TC, Weiner MW, Meyerhoff DJ.: [Are Treated Alcoholics Representative of the Entire Population with Alcohol Use Disorders? – A Magnetic Resonance Study of Brain Injury](#). Alcohol, 42(2):67-76, 2008. PMC2426953

Curriculum Vitae - Michael W. Weiner, M.D.

407. Schuff N, Neylan TC, Fox-Bosetti S, Lenoci M, Samuelson KW, Studholme C, Kornak J, Marmar CR, Weiner MW.: [Abnormal N-acetylaspartate in hippocampus and anterior cingulate in posttraumatic stress disorder](#). Psych Res, 162(2):147-57, 2008. PMC2443727
408. Weiner MW: [Leon Thal's Vision for the Treatment and Prevention of Alzheimer's Disease](#). Alzheimer's and Dementia, 4(1):S150-2, 2008. PMC2556211
409. Jagust WJ, Zheng L, Harvey DJ, Mack WJ, Vinters HV, Weiner MW, Ellis WG, Zarow C, Mungas D, Reed BR, Kramer JH, Schuff N, DeCarli C, Chui HC: [Neuropathological Basis of Magnetic Resonance Images in Aging and Dementia](#). Ann Neuro, 63(1):72-80, 2008. PMC2624571
410. Seeley WW, Crawford R, Rascovsky K, Kramer JH, Weiner M, Miller BL, Gorno-Tempini ML: [Frontal paralimbic network atrophy in very mild behavioral variant frontotemporal dementia](#). Arch Neurol, 65(2):249-55, 2008. PMC2544627
411. Weiner MW. [Expanding ventricles may detect preclinical Alzheimer's disease](#). Neurology, 70(11):824-5, 2008. PMC2561217
412. Jack CR Jr, Bernstein MA, Fox NC, Thompson P, Alexander G, Harvey D, Borowski B, Britson PJ, Whitwell J, Ward C, Dale AM, Felmlee JP, Gunter JL, Hill DL, Killiany R, Schuff N, Fox-Bosetti, S, Lin C, Studholme C, Decarli CS, Gunnar Krueger, Ward HA, Metzger GJ, Scott KT, Mallozzi R, Blezek D, Levy J, Debbins JP, Fleisher AS, Albert M, Green R, Bartzokis G, Glover G, Mugler J, Weiner MW, ADNI Study. [The Alzheimer's disease neuroimaging initiative \(ADNI\): MRI methods](#). J Magn Reson Imaging, 27(4):685-91, 2008. PMC2544629
413. Hua X, Leow AD, Lee S, Klunder AD, Toga A, Lepore N, Chou Y-Y, Brun C, Chiang M-C, Barysheva M, Jack Jr. CR, Bernstein MA, Britson PJ, Ward CP, Whitwell JL, Borowski B, Fleisher AS, Fox NC, Boyes RG, Barnes J, Harvey D, Kornak J, Schuff N, Boreta L, Alexander GE, Weiner MW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative. [3D characterization of brain atrophy in Alzheimer's disease and mild cognitive impairment using tensor-based morphometry](#). NeuroImage, 41(1):19-34, 2008. PMC2556222
414. Jahng GH, Weiner MW, Schuff N. [Diffusion anisotropy indexes are sensitive to selecting the EPI readout-encoding bandwidth at high-field MRI](#). Magn Reson Imaging, 26(5):676-82, 2008. PMC2556209
415. Lavretsky H, Zheng L, Weiner MW, Mungas D, Reed B, Kramer JH, Jagust W, Chui H, Mack WJ. [The MRI brain correlates of depressed mood, anhedonia, apathy, and anergia in older adults with and without cognitive impairment or dementia](#). Int J Geriatr Psychiatry, 23(10):1040-50, 2008. PMC2575050
416. Gazdzinski S, Kornak J, Weiner MW, Meyerhoff DJ. [Body mass index and magnetic resonance markers of brain integrity in adults](#). Ann Neurol, 63(5):652-7, 2008. PMC2542059

Curriculum Vitae - Michael W. Weiner, M.D.

417. Kuczynski B, Reed B, Mungas D, Weiner M, Chui HC, Jagust W. [Cognitive and Anatomic Contributions of Metabolic Decline in Alzheimer Disease and Cerebrovascular Disease](#). Arch Neurol, 65(5):650-655, 2008. PMC2556212
418. Hoefer M, Allison SC, Schauer GF, Neuhaus JM, Hall J, Dang JN, Weiner MW, Miller BL, Rosen HJ. [Fear conditioning in frontotemporal lobar degeneration and Alzheimer's disease](#). Brain, 131(Pt 6):1646-57, 2008. PMC2544622
419. Morra JH, Tu Z, Apostolova LG, Green AE, Avedissian C, Madsen SK, Parikshak N, Hua X, Toga AW, Jack CR Jr, Weiner MW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative. [Validation of a fully automated 3D hippocampal segmentation method using subjects with Alzheimer's disease mild cognitive impairment, and elderly controls](#). Neuroimage, 43: 59-68, 2008. PMC2624575
420. Khachaturian ZS, Petersen RC, Gauthier S, Buckholtz N, Corey-Bloom JP, Evans B, Fillit H, Foster N, Greenberg B, Grundman M, Sano M, Simpkins J, Schneider LS, Weiner MW, Galasko D, Hyman B, Kuller L, Schenk D, Snyder S, Thomas RG, Tuszyński MH, Vellas B, Wurtzman RJ, Snyder PJ, Frank RA, Albert M, Doody R, Ferris S, Kaye J, Koo E, Morrison-Bogorad M, Reisberg B, Salmon DP, Gilman S, Mohs R, Aisen PS, Breitner JC, Cummings JL, Kawas C, Phelps C, Poirier J, Sabbagh M, Touchon J, Khachaturian AS, Bain LJ. [A roadmap for the prevention of dementia: the inaugural Leon Thal Symposium](#). Alzheimer's & Dementia, 4(3):156-63, 2008. PMC2544623
421. Mueller SG, Schuff N, Rapoport J, Elman J, Weiner MW. [Selective effect of Apo e4 on CA3 and dentate in normal aging and Alzheimer's disease using high resolution MRI at 4 T](#). NeuroImage, 42(1):42-8, 2008. PMC2597377
422. Hua X, Leow AD, Parikshak N, Lee S, Chiang MC, Toga AW, Jack CR Jr, Weiner MW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative. [Tensor-based morphometry as a neuroimaging biomarker for Alzheimer's disease: An MRI study of 676 AD, MCI, and normal subjects](#). NeuroImage, 43(3):458-69, 2008. PMC3197851
423. Frisoni GB, Henneman WJP, Weiner MW, Scheltens P, Vellas B, Reynish E, Hudecova J, Hampel H, Burger K, Blennow K, Waldemar G, Johannsen P, Wahlund L-O, Zito G, Rossini PM, Winblad B, Barkhof F, Alzheimer's Disease Neuroimaging Initiative. [The pilot European Alzheimer's Disease Neuroimaging Initiative of the European Alzheimer's Disease Consortium](#). Alzheimer's & Dementia, 4(4): 255-64, 2008. PMC2657833
424. Hadjidemetriou S, Lorenzen P, Schuff N, Mueller S, Weiner M. [Computational atlases of severity of white matter lesions in elderly subjects with MRI](#). Med Image Comput Comput Assist Interv Int Conf Med Image Comput Comput Assist Interv, 11(Pt 1):450-8, 2008. PMID: 18979778

Curriculum Vitae - Michael W. Weiner, M.D.

425. Hadjidemetriou S, Studholme C, Mueller S, Weiner M, Schuff N. [Restoration of MRI Data for Intensity Non-uniformities using Local High Order Intensity Statistics](#). Medical Image Analysis, 13(1):36-48, 2009. PMC2597709
426. Young K, Du A-T, Kramer J, Rosen H, Miller B, Weiner M, Schuff N. [Patterns of Structural Complexity in Alzheimer's Disease and Frontotemporal Dementia](#). Human Brain Mapping, 30(5):1667-77, 2009. PMC2736103
427. Siger M, Schuff N, Zhu X, Miller BL, Weiner MW. [Regional myo-inositol concentration in mild cognitive impairment using ¹H magnetic resonance spectroscopic imaging](#). Alzheimer's Disease and Associated Disorders, 23(1):57-62, 2009. PMC3039549
428. Pa J, Boxer AL, Freeman K, Kramer J, Miller BL, Chao LL, Gazzaley A, Weiner MW, Neuhaus J, Johnson JK. [Clinical-Neuroimaging Characteristics of Dysexecutive Mild Cognitive Impairment](#). Annals of Neurology, 65(4):414-23, 2009. PMC2680500
429. Morra JH, Tu Z, Apostolova LG, Green AE, Avedissian C, Madsen SK, Parikshak N, Hua X, Toga AW, Jack CR Jr., Schuff N, Weiner MW, Thompson PM. [Automated 3D Mapping of Hippocampal Atrophy and its Clinical Correlates in 400 subjects with Alzheimer's Disease, Mild Cognitive Impairment, and Elderly Controls](#). Human Brain Mapping, 30(9):2766-88, 2009. PMC2733926
430. Raman R, Thomas RG, Weiner MW, Jack CR, Ernstrom K, Aisen PS, Tariot PN, Quinn JF. [MRI substudy participation in Alzheimer disease \(AD\) clinical trials: Baseline comparability of a substudy sample to entire study population](#). Alzheimer Dis Assoc Disord, 23(4):333-6, 2009. PMC2804922
431. Rankin KP, Salazar A, Gorno-Tempini ML, Sollberger M, Wilson SM, Pavlic D, Stanley CM, Glenn S, Weiner MW, Miller BL. [Detecting sarcasm from paralinguistic cues: anatomic and cognitive correlates in neurodegenerative disease](#). Neuroimage, 47(4):2005-15, 2009. PMC2720152
432. Mormino EC, Kluth JT, Madison CM, Rabinovici GD, Baker SL, Miller BL, Koeppe RA, Mathis CA, Weiner MW, Jagust WJ, and the Alzheimer's Disease Neuroimaging Initiative. [Episodic memory loss is related to hippocampal-mediated beta-amyloid deposition in elderly subjects](#). Brain, 132(Pt 5):1310-23, 2009. PMC2677792
433. Morra JH, Tu Z, Apostolova LG, Green AE, Avedissian C, Madsen SK, Parikshak N, Toga AW, Jack CR Jr, Schuff N, Weiner MW, Thompson PM, The Alzheimer's Disease Neuroimaging Initiative. [Automated mapping of hippocampal atrophy in 1-year repeat MRI data from 490 subjects with Alzheimer's disease, mild cognitive impairment, and elderly controls](#). Neuroimage, 45(1 Suppl):S3-15, 2009. PMC2733354

Curriculum Vitae - Michael W. Weiner, M.D.

434. Sollberger M, Stanley C, Wilson S, Gyurak A, Weiner M, Miller B, Rankin K. [Neural Basis of Interpersonal Traits in Neurodegenerative Diseases](#). *Neuropsychologia*, 47(13):2812-27, 2009. PMC2765796
435. Chou Y-Y, Lepore N, Avedissian C, Madsen SK, Parikshak N, Hua X, Shaw LM, Trojanowski JQ, Weiner MW, Toga AW. [Mapping correlations between ventricular expansion and CSF amyloid and Tau biomarkers in 240 subjects with Alzheimer's disease, mild cognitive impairment and elderly controls](#). *NeuroImage*, 46(2):394-410, 2009. PMC2696357
436. Leow AD, Yanovsky I, Parikshak N, Hua X, Lee S, Toga AW, Jack CR Jr, Bernstein MA, Britson PJ, Gunter JL, Ward CP, Borowski B, Shaw LM, Trojanowski JQ, Fleisher AS, Harvey D, Kornak J, Schuff N, Alexander GE, Weiner MW, Thompson PM and the Alzheimer's Disease Neuroimaging Initiative. [Alzheimer's Disease Neuroimaging Initiative: A One-year Follow up Study Using Tensor-based Morphometry Correlating Degenerative Rates, Biomarkers and Cognition](#). *NeuroImage*, 45(3):645-55, 2009. PMC2696624
437. Jack Jr. CR, Lowe VJ, Weigand SD, Wiste HJ, Senjem ML, Knopman DS, Shiung MM, Gunter JL, Boeve BF, Kemp BJ, Weiner M, Petersen RC, and the Alzheimer's Disease Neuroimaging Initiative. [Serial PIB and MRI in normal, mild cognitive impairment and Alzheimer's disease: implications for sequence of pathological events in Alzheimer's disease](#). *Brain*, 132(Pt 5):1355-65, 2009. PMC2677798
438. Wilson SM, Ogar JM, Laluz V, Growdon M, Jang J, Glenn S, Miller BL, Weiner M, Gorno-Tempini ML. [Automated MRI-based classification of primary progressive aphasia variants](#). *NeuroImage*, 47(4):1558-67, 2009. PMC2719687
439. Desikan RS, Cabral HJ, Hess CP, Dillon WP, Glastonbury CM, Weiner MW, Schmansky NJ, Greve DN, Salat DH, Buckner RL, Fischl B. [Automated MRI Measures Identify Individuals with Mild Cognitive Impairment and Alzheimer's Disease](#). *Brain*, 132(Pt 8):2048-57, 2009. PMC2714061
440. Langbaum JBS, Chen K, Lee W, Reschke C, Bandy D, Fleisher AS, Alexander GE, Foster NL, Weiner MW, Koeppe RA, Jagust WJ, Reiman EM, and the Alzheimer's Disease Neuroimaging Initiative. [Categorical and Correlational Analyses of Baseline Fluorodeoxyglucose Positron Emission Tomography Images from the Alzheimer's Disease Neuroimaging Initiative \(ADNI\)](#). *NeuroImage*, 45(4):1107-1116, 2009. PMC2886795
441. Clarkson MJ, Ourselin S, Neilsen C, Leung KK, Barnes J, Whitwell JL, Gunter JL, Hill D, Weiner MW, Jack CR, Fox NC. [Comparison of Phantom and Registration Scaling Corrections using the ADNI Cohort](#). *NeuroImage*, 47(4):1506-13, 2009. PMC2800076
442. Cardenas V, Meyerhoff D, Studholme C, Kornak J, Rothlind J, Lampiris H, Neuhaus J, Grant R, Chao L, Truran D, Weiner M. [Evidence for ongoing brain injury in human](#)

Curriculum Vitae - Michael W. Weiner, M.D.

- immunodeficiency virus-positive patients treated with antiretroviral therapy. J Neurovirol, 4:1-10, 2009. PMC2889153
443. Zhang Y, Schuff N, Du AT, Rosen HJ, Kramer JH, Gorno-Tempini ML, Miller BL, Weiner MW. White matter damage in frontotemporal dementia and Alzheimer's disease measured by diffusion MRI. Brain, 132(Pt 9):2579-92, 2009. PMC2732263
444. Mueller SG, Weiner MW. Selective Effect of Age, Apo e4, and Alzheimer's disease on hippocampal subfields. Hippocampus, 19(6):558-64, 2009. PMC2802542
445. Possin KL, Brambati SM, Rosen HJ, Johnson JK, Pa J, Weiner MW, Miller BL, Kramer JH. Rule violation errors are associated with right lateral prefrontal cortex atrophy in neurodegenerative disease. J Int Neuropsychol Soc, 15(3):354-64, 2009. PMC2748220
446. Mueller SG, Laxer KD, Barakos J, Cheong I, Garcia P, Weiner MW. Subfield atrophy pattern in temporal lobe epilepsy with and without mesial sclerosis detected by high resolution MRI at 4 Tesla: Preliminary results. Epilepsia, 50(6):1474-83, 2009. PMC2804395
447. Schuff N, Woerner N, Boreta L, Kornfield T, Shaw LM, Trojanowski JQ, Thompson PM, Jack CR Jr, Weiner MW, Alzheimer's Disease Neuroimaging Initiative. MRI of hippocampal volume loss in early Alzheimer's disease in relation to ApoE genotype and biomarkers. Brain, 132(Pt 4):1067-77, 2009. PMC2668943
448. Schuff N, Matsumoto S, Kmiecik J, Studholme C, Du AT, Ezekiel F, Miller BL, Kramer JH, Jagust WJ, Chui HC, Weiner MW. Cerebral blood flow in ischemic vascular dementia and Alzheimer's disease, measured by arterial spin-labeling magnetic resonance imaging. Alzheimer's & Dementia, 5(6):454-462, 2009. PMC2802181
449. Potkin SG, Guffanti G, Lakatos A, Turner JA, Kruggel F, Fallon JH, Saykin AJ, Orro A, Lupoli S, Salvi E, Weiner M, Macciardi F. Hippocampal atrophy as a quantitative trait in a genome-wide association study identifying novel susceptibility genes for Alzheimer's disease. PLoS ONE, 4(8):e6501-15, 2009. PMC2719581
450. Vemuri P, Wiste HJ, Weigand SD, Shaw LM, Trojanowski JQ, Weiner MW, Knopman DS, Petersen RC, Jack CR Jr., Alzheimer's Disease Neuroimaging Initiative. MRI and CSF biomarkers in normal, MCI, and AD subjects: predicting future clinical change. Neurology, 73(4):294-301, 2009. PMC2715214
451. Vemuri P, Wiste HJ, Weigand SD, Shaw LM, Trojanowski JQ, Weiner MW, Knopman DS, Petersen RC, Jack CR Jr., Alzheimer's Disease Neuroimaging Initiative. MRI and CSF biomarkers in normal, MCI, and AD subjects: diagnostic discrimination and cognitive correlations. Neurology, 73(4):287-93, 2009. PMC2715210
452. Hua X, Lee S, Yanovsky I, Leow AD, Chou YY, Ho AJ, Gutman B, Toga AW, Jack CR Jr., Bernstein MA, Reiman EM, Harvey DJ, Kornak J, Schuff N, Alexander GE, Weiner MW,

Curriculum Vitae - Michael W. Weiner, M.D.

Thompson PM, the Alzheimer's Disease Neuroimaging Initiative. [Optimizing power to track brain degeneration in Alzheimer's disease and mild cognitive impairment with tensor-based morphometry: An ADNI study of 515 subjects](#). Neuroimage, 48(4):668-81, 2009.
PMC2971697

453. Jagust WJ, Landau SM, Shaw LM, Trojanowski JQ, Koeppen RA, Reiman EM, Foster NL, Petersen RC, Weiner MW, Price JC, Mathis CA, Alzheimer's Disease Neuroimaging Initiative. [Relationships between biomarkers in aging and dementia](#). Neurology, 73(15):1193-1199, 2009. PMC2764726
454. Tosun D, Schuff N, Weiner M. [An integrated multimodality MR brain imaging study: Gray matter tissue loss mediates the association between cerebral hypoperfusion and alzheimer's disease](#). Conf Proc IEEE Eng Med Bio Soc, 1:6981-4, 2009. PMC2804924
455. Van Boven RW, Harrington GS, Hackney DB, Ebel A, Gauger G, Bremner JD, D'Esposito M, Detre JA, Haacke EM, Jack CR Jr, Jagust WJ, Le Bihan D, Mathis CA, Mueller S, Mukherjee P, Schuff N, Chen A, Weiner MW. [Advances in neuroimaging of traumatic brain injury and posttraumatic stress disorder](#). J Rehabil Res Dev, 46(6):717-57, 2009.
PMC3233771
456. Gunter JL, Bernstein MA, Borowski BJ, Ward CP, Britson PJ, Felmlee JP, Schuff N, Weiner M, Jack CR. [Measurement of MRI scanner performance with the ADNI phantom](#). Med Phys, 36(6):2193-205, 2009. PMC2754942
457. Mueller SG, Laxer KD, Barakos J, Cheong I, Garcia P, Weiner MW. [Widespread neocortical abnormalities in temporal lobe epilepsy with and without mesial sclerosis](#). NeuroImage, 46(2):353-9, 2009. PMC2799165
458. Zhan W, Zhang Y, Mueller SG, Lorenzen P, Hadjidemetriou S, Schuff N, Weiner MW. [Characterization of white matter degeneration in elderly subjects by magnetic resonance diffusion and FLAIR imaging correlation](#). NeuroImage, 47 (Suppl 2):T58-65, 2009.
PMC2720418
459. Chao LL, Pa J, Duarte A, Schuff N, Weiner MW, Kramer JH, Miller BL, Freeman KM, Johnson JK. [Patterns of cerebral hypoperfusion in amnestic and dysexecutive MCI](#). Alzheimer Dis Assoc Disord, 23(3): 245-52, 2009. PMC2760039
460. Rosen A, Zhang Y, Zhan W, Kasprisin A, Martinson S, Cheng J, Weiner M, Yesavage JA, Folio L, Ashford JW. [Mild Traumatic Brain Injury and Conduction Aphasia from a Close Proximity Blast Resulting in Arcuate Fasciculus Damage Diagnosed on DTI Tractography](#). Military Medicine, 174(11):v-vi, 2009. PMID: 19960837
461. Samuelson KW, Neylan TC, Lenoci M, Metzler TJ, Cardenas V, Weiner MW, Marmar CR. [Longitudinal Effects of PTSD on Memory Functioning](#). J Int Neuropsychol Soc, 15(6): 853-61, 2009. PMID: 19703319

Curriculum Vitae - Michael W. Weiner, M.D.

462. Weiner MW. [Editorial: Imaging and biomarkers will be used for detection and monitoring progression of early Alzheimer's Disease](#). J Nutr Health Aging, 13(4):332, 2009. PMID: 19300869
463. Kornak J, Young K, Schuff N, Du A, Maudsley AA, Weiner MW. [K-Bayes Reconstruction for Perfusion MRI I: Concepts and Application](#). J Digit Imaging, 23(3):277-86, 2010. PMC2865632
464. Chao LL, Buckley ST, Kornak J, Schuff N, Madison C, Yafee K, Miller BL, Kramer JH, Weiner MW. [ASL Perfusion MRI Predicts Cognitive Decline and Conversion from MCI to Dementia](#). ADAD, 24(1):19-27, 2010. PMC2865220
465. Adamson MM, Landy K, Duong S, Fox-Bosetti S, Ashford JW, Murphy GM, Weiner M, Taylor JL. [Apolipoprotein E varepsilon4 influences on episodic recall and brain structures in aging pilots](#). Neurobiology of Aging, 31(6):1059-63, 2010. PMC2858239
466. Zhang Y, Du A-T, Hayasaka S, Jahng G-H, Hlavin J, Zhan W, Weiner MW, Schuff N. [Patterns of Age-Related Water Diffusion Changes in Human Brain by Concordance and Discordance Analysis](#). Neurobiol Aging, 31(11): 1991-2001, 2010. PMC2888604
467. Chao LL, Mueller SG, Buckley ST, Peek K, Raptentsetsang S, Elman J, Yaffe K, Miller BL, Kramer JH, Madison C, Mungas D, Schuff N, Weiner MW. [Evidence of neurodegeneration in brains of older adults who do not yet fulfill MCI criteria](#). Neurobiology of Aging, 31(3):368-77, 2010. PMC2814904
468. Mueller SG, Mack WJ, Mungas D, Kramer JH, Cardenas-Nicolson V, Lavretsky H, Greene M, Schuff N, Chui HC, Weiner MW. [Influences of lobar gray matter and white matter lesion load on cognition and mood](#). Psychiatry Research, 181(2):90-6, 2010. PMC2814971
469. Krueger CE, Dean DL, Rosen HJ, Halabi C, Weiner M, Miller BL, Kramer JH. [Longitudinal rates of lobar atrophy in Frontotemporal Dementia, Semantic Dementia, and Alzheimer's disease](#). Alzheimer Dis Assoc Disord, 24(1):43-8, 2010. PMC2837112
470. Mueller SG, Schuff N, Yaffe K, Madison C, Miller B, Weiner MW. [Hippocampal Atrophy Patterns in Mild Cognitive Impairment and Alzheimer's Disease](#). Human Brain Mapping, 31(9): 1339-47, 2010. PMC2943433
471. Shimizu S, Zhang Y, Laxamana J, Miller BL, Kramer JH, Weiner MW, Schuff N. [Concordance and discordance between brain perfusion and atrophy in frontotemporal dementia](#). Brain Imaging and Behavior, 4(1):46-54, 2010. PMC2854356
472. Rosen HJ, Alcantar O, Rothlind J, Sturm V, Kramer JH, Weiner M, Miller BL. [Neuroanatomical correlates of cognitive self-appraisal in neurodegenerative disease](#). Neuroimage, 49(4):3358-64, 2010. PMC2818772

Curriculum Vitae - Michael W. Weiner, M.D.

473. Gazdzinski S, Millin R, Kaiser LG, Durazzo TC, Mueller SG, Weiner MW, Meyerhoff DJ. [BMI and Neuronal Integrity in Healthy, Cognitively Normal Elderly: a Proton Magnetic Resonance Spectroscopy Study](#). *Obesity*, 18(4):743-8, 2010. PMC2847061
474. Ho AJ, Hua X, Lee S, Leow AD, Yanovsky I, Gutman B, Dinov ID, Lepore N, Stein JL, Toga AW, Jack CR Jr, Bernstein MA, Reiman EM, Harvey DJ, Kornak J, Schuff N, Alexander GE, Weiner MW, Thompson PM, The Alzheimer's Disease Neuroimaging Initiative. [Comparing 3 T and 1.5 T MRI for tracking Alzheimer's disease progression with tensor-based morphometry](#). *Hum Brain Mapp*, 31(4):499-514, 2010. PMC2875376
475. Luks TL, Oliveira M, Possin KL, Bird A, Miller BL, Weiner MW, Kramer JH. [Atrophy in two attention networks is associated with performance on a Flanker task in neurodegenerative disease](#). *Neuropsychologia*, 48(1):165-170, 2010. PMC3018338
476. Jack CR Jr, Knopman DS, Jagust WJ, Shaw LM, Aisen PS, Weiner MW, Petersen RC, Trojanowski JQ. [Hypothetical model of dynamic biomarkers of the Alzheimer's pathological cascade](#). *Lancet Neurol*, 9(1):119-28, 2010. PMC2819840
477. Kuczynski B, Targan E, Madison C, Weiner M, Zhang Y, Reed B, Chui HC, Jagust W. [White matter integrity and cortical metabolic associations in aging and dementia](#). *Alzheimer's and Dementia*, 6(1):54-62, 2010. PMC2817977
478. Rule RR, Schuff N, Miller RG, Weiner MW. [Gray Matter Perfusion Correlates with Disease Severity in ALS](#). *Neurology*, 74(10):821-7, 2010. PMC2839193
479. Shen L, Kim S, Risacher SL, Nho K, Swaminathan S, West JD, Foroud T, Pankratz N, Moore JH, Sloan CD, Huettel MJ, Craig DW, Dechairo BM, Potkin SG, Jack CR Jr, Weiner MW, Saykin AJ, Alzheimer's Disease Neuroimaging Initiative. [Whole Genome Association Study of Brain-Wide Imaging Phenotypes for Identifying Quantitative Trait Loci in MCI and AD: A Study of the ADNI Cohort](#). *NeuroImage*, 53(3): 1051-63, 2010. PMC2892122
480. Apostolova LG, Morra JH, Green AE, Hwang KS, Avedissian C, Woo E, Cummings JL, Toga AW, Jack CR Jr, Weiner MW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative. [Automated 3D mapping of baseline and 12-month associations between three verbal memory measures and hippocampal atrophy in 490 ADNI subjects](#). *NeuroImage*, 51(1):488-99, 2010. PMC2847034
481. Rabinovici GD, Furst AJ, Alkalay A, Racine CA, O'Neil JP, Janabi M, Baker SL, Agarwal N, Bonasera SJ, Mormino EC, Weiner MW, Gorno-Tempini ML, Rosen HJ, Miller BL, Jagust WJ. [Increased metabolic vulnerability in early-onset Alzheimer's disease is not related to amyloid burden](#). *Brain*, 133(Pt 2): 512-28, 2010. PMC2858015

Curriculum Vitae - Michael W. Weiner, M.D.

482. Petersen RC, Aisen PS, Beckett LA, Donohue MC, Gamst AC, Harvey DJ, Jack CR Jr, Jagust WJ, Shaw LM, Toga AW, Trojanowski JQ, Weiner MW. [Alzheimer's Disease Neuroimaging Initiative \(ADNI\): Clinical Characterization](#). *Neurology*, 74(3):201-9, 2010. PMC2809036
483. Leung KK, Clarkson MJ, Bartlett JW, Clegg S, Jack CR Jr, Weiner MW, Fox NC, Ourselin S, the Alzheimer's Disease Neuroimaging Initiative. [Robust atrophy rate measurement in Alzheimer's disease using multi-site serial MRI: Tissue-specific intensity normalization and parameter selection](#). *NeuroImage*, 50(2):516-23, 2010. PMC2828361
484. Mueller SG, Laxer KD, Barakos J, Cheong I, Finlay D, Garcia P, Cardenas-Nicolson V, Weiner MW. [Involvement of the thalamocortical network in TLE with and without mesiotemporal sclerosis](#). *Epilepsia*, 51(8):1436-45, 2010. PMC2888933
485. Wang Z, Neylan TC, Mueller SG, Lenoci M, Truran D, Marmar CR, Weiner MW, Schuff N. [Magnetic resonance imaging of hippocampal subfields in posttraumatic stress disorder](#). *Arch Gen Psychiatry*, 67(3):296-303, 2010. PMC2848481
486. Stein JL, Hua X, Morra JH, Lee S, Hibar DP, Ho AJ, Leow AD, Toga AW, Sul JH, Kang HM, Eskin E, Saykin AJ, Shen L, Foroud T, Pankratz N, Huentelman MJ, Craig DW, Gerber JD, Allen AN, Corneveaux JJ, Stephan DA, Webster J, Dechairo BM, Potkin SG, Jack CR Jr, Weiner MW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative. [Genome-wide analysis reveals novel genes influencing temporal lobe structure with relevance to neurodegeneration in Alzheimer's Disease](#). *Neuroimage*, 51(2):542-54, 2010. PMC2856746
487. Adamson MM, Samarina V, Xiangyan X, Huynh V, Kennedy Q, Weiner M, Yesavage J, Taylor JL. [The impact of brain size on pilot performance varies with aviation training and years of education](#). *J Int Neuropsychol Soc*, 16(3):412-23, 2010. PMC2862858
488. Stein JL, Hua X, Lee S, Ho AJ, Leow AD, Toga AW, Saykin AJ, Shen L, Foroud T, Pankratz N, Huentelman MJ, Craig DW, Gerber JD, Allen AN, Corneveaux JJ, Dechairo BM, Potkin SG, Weiner MW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative. [Voxelwise genome-wide association study \(vGWAS\)](#). *Neuroimage*, 53(3): 1160-74, 2010. PMC2900429
489. Lavretsky H, Zheng L, Weiner MW, Mungas D, Reed B, Kramer JH, Jagust W, Chui H, Mack WJ. [Association of depressed mood and mortality in older adults with and without cognitive impairment in a prospective naturalistic study](#). *Am J Psychiatry*, 167(5):589-97, 2010. PMC2864365
490. Hua X, Lee S, Hibar DP, Yanovsky I, Leow AD, Toga AW, Jack CR Jr, Bernstein MA, Reiman EM, Harvey DJ, Kornak J, Schuff N, Alexander GE, Weiner MW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative. [Mapping Alzheimer's disease progression in 1309 MRI scans: Power estimates for different inter-scan intervals](#). *Neuroimage*, 51(1):63-75, 2010. PMC2846999

Curriculum Vitae - Michael W. Weiner, M.D.

491. Landau SM, Harvey D, Madison CM, Reiman EM, Foster NL, Aisen PS, Petersen RC, Shaw LM, Trojanowski JQ, Jack CR Jr, Weiner MW, Jagust WJ, and the Alzheimer's Disease Neuroimaging Initiative. [Comparing predictors of conversion and decline in mild cognitive impairment](#). *Neurology*, 75(3):230-8, 2010. PMC2906178
492. Ho AJ, Stein JL, Hua X, Lee S, Hibar DP, Leow AD, Dinov ID, Toga AW, Saykin AJ, Shen L, Foroud T, Pankratz N, Huentelman MJ, Craig DW, Gerber JD, Allen AN, Corneveaux JJ, Stephan DA, DeCarli CS, DeChairo BM, Potkin SG, Jack CR Jr, Weiner MW, Raji CA, Lopez OL, Becker JT, Carmichael OT, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative. [A commonly carried allele of the obesity-related FTO gene is associated with reduced brain volume in healthy elderly](#). *Proceedings of the National Academy of Sciences*, 107(18):8404-9, 2010. PMC2889537
493. Pa J, Possin KL, Wilson SM, Quitania LC, Kramer JH, Boxer AL, Weiner MW, Johnson JK. [Gray matter correlates of set-shifting among neurodegenerative disease, mild cognitive impairment, and healthy older adults](#). *J Int Neuropsychol Soc*, 16(4):640-50, 2010. PMC2891121
494. Chen K, Langbaum JB, Fleisher AS, Ayutyanont N, Reschke C, Lee W, Liu X, Bandy D, Alexander GE, Thompson PM, Foster NL, Harvey DJ, de Leon MJ, Koeppe RA, Jagust WJ, Weiner MW, Reiman EM, The Alzheimer's Disease Neuroimaging Initiative. [Twelve-month metabolic declines in probable Alzheimer's disease and amnestic mild cognitive impairment assessed using an empirically pre-defined statistical region-of-interest: Findings from the Alzheimer's Disease Neuroimaging Initiative](#). *Neuroimage*, 51(2):654-64, 2010. PMC2856742
495. Ho AJ, Raji CA, Becker JT, Lopez OL, Kuller LH, Hua X, Lee S, Hibar D, Dinov ID, Stein JL, Jack CR Jr, Weiner MW, Toga AW, Thompson PM. [Obesity is linked with lower brain volume in 700 AD and MCI patients](#). *Neurobiology of Aging*, 31(8):1326-39, 2010. PMC3197833
496. Roman GC, Salloway S, Black SE, Royall DR, DeCarli C, Weiner MW, Moline M, Kumar D, Schindler R, Posner H. [Randomized, Placebo-Controlled, Clinical Trial of Donepezil in Vascular Dementia. Differential Effects by Hippocampus Size](#). *Stroke*, 41(6):1213-21, 2010. PMC2954887
497. Hua X, Hibar DP, Lee S, Toga AW, Jack CR Jr, Weiner MW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative. [Sex and age differences in atrophic rates: an ADNI study with N=1368 MRI scans](#). *Neurobiology of Aging*, 31(8):1463-80, 2010. PMC2927200
498. Risacher SL, Shen L, West JD, Kim S, McDonald BC, Beckett LA, Harvey DJ, Jack CR Jr, Weiner MW, Saykin AJ, the Alzheimer's Disease Neuroimaging Initiative. [Longitudinal MRI atrophy biomarkers: Relationship to conversion in the ADNI cohort](#). *Neurobiology of Aging*, 31(8):1401-18, 2010. PMC2904350

Curriculum Vitae - Michael W. Weiner, M.D.

499. Saykin AJ, Shen L, Foroud TM, Potkin SG, Swaminathan S, Kim S, Risacher SL, Nho K, Huentelman MJ, Craig DW, Thompson PM, Stein JL, Moore JH, Farrer LA, Green RC, Bertram L, Jack CR Jr, Weiner MW, the Alzheimer's Disease Neuroimaging Initiative. [Alzheimer's Disease Neuroimaging Initiative biomarkers as quantitative phenotypes: Genetics core aims, progress, and plans](#). *Alzheimer's & Dementia*, 6(3):265-73, 2010. PMC2868595
500. Zhou J, Greicius MD, Gennatas ED, Growdon ME, Jang JY, Rabinovici GD, Kramer JH, Weiner M, Miller BL, Seeley WW. [Divergent network connectivity changes in behavioural variant frontotemporal dementia and Alzheimer's disease](#). *Brain*, 133(Pt 5):1352-67, 2010. PMC2912696
501. Vemuri P, Wiste HJ, Weigand SD, Knopman DS, Shaw LM, Trojanowski JQ, Aisen PS, Weiner M, Petersen RC, Jack CR Jr, the Alzheimer's Disease Neuroimaging Initiative. [Effect of apolipoprotein E on biomarkers of amyloid load and neuronal pathology in Alzheimer disease](#). *Ann Neurol*, 67(3):308-16, 2010. PMC2886799
502. Vichinsky EP, Neumayr LD, Gold JI, Weiner MW, Rule RR, Truran D, Kasten J, Eggleston B, Kessler K, McMahon L, Orringer EP, Harrington T, Kalinyak K, De Castro LM, Kutlar A, Rutherford CJ, Johnson C, Bessman JD, Jordan LB, Armstrong FD; for the Neuropsychological Dysfunction and Neuroimaging Adult Sickle Cell Anemia Study Group. [Neuropsychological Dysfunction and Neuroimaging Abnormalities in Neurologically Intact Adult Patients with Sickle Cell Anemia](#). *JAMA*, 303:1823-31, 2010. PMC2892214
503. Raj A, Mueller SG, Young K, Laxer KD, Weiner M. [Network-level analysis of cortical thickness of the epileptic brain](#). *Neuroimage*, 52(4):1302-13, 2010. PMC2910126
504. Nettiksimmons J, Harvey D, Brewer J, Carmichael O, Decarli C, Jack CR Jr, Petersen R, Shaw LM, Trojanowski JQ, Weiner MW, Beckett L, Alzheimer's Disease Neuroimaging Initiative. [Subtypes based on cerebrospinal fluid and magnetic resonance imaging markers in normal elderly predict cognitive decline](#). *Neurobiol Aging*, 31(8):1419-28, 2010. PMC2902683
505. Kohannim O, Hua X, Hibar DP, Lee S, Chou YY, Toga AW, Jack CR Jr, Weiner MW, Thompson PM, Alzheimer's Disease Neuroimaging Initiative. [Boosting power for clinical trials using classifiers based on multiple biomarkers](#). *Neurobiol Aging*, 31(8):1429-42, 2010. PMC2903199
506. Madsen SK, Ho AJ, Hua X, Saharan PS, Toga AW, Jack CR Jr, Weiner MW, Thompson PM, Alzheimer's Disease Neuroimaging Initiative. [3D maps localize caudate nucleus atrophy in 400 Alzheimer's disease, mild cognitive impairment, and healthy elderly subjects](#). *Neurobiol Aging*, 31(8):1312-25, 2010. PMC2903198
507. Lakatos A, Derbeneva O, Younes D, Keator D, Bakken T, Lvova M, Brandon M, Guffanti G, Reglodi D, Saykin A, Weiner M, Maciardi F, Schork N, Wallace DC, Potkin SG, Alzheimer's Disease Neuroimaging Initiative. [Association between mitochondrial DNA](#)

Curriculum Vitae - Michael W. Weiner, M.D.

- [variations and Alzheimer's disease in the ADNI cohort](#). Neurobiol Aging, 31(8):1355-63, 2010. PMC2918801
508. Apostolova LG, Hwang KS, Andrawis JP, Green AE, Babakchanian S, Morra JH, Cummings JL, Toga AW, Trojanowski JQ, Shaw LM, Jack CR Jr, Petersen RC, Aisen PS, Jagust WJ, Koeppen RA, Mathis CA, Weiner MW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative. [3D PIB and CSF biomarker associations with hippocampal atrophy in ADNI subjects](#). Neurobiol Aging, 31(8):1284-303, 2010. PMC3051831
509. Nezamzadeh M, Matson GB, Young K, Weiner MW, Schuff N. [Improved pseudo-continuous arterial spin labeling for mapping brain perfusion](#). J Magn Reson Imaging, 31(6):1419-27, 2010. PMC3121564
510. Tosun D, Schuff N, Truran-Sacrey D, Shaw LM, Trojanowski JQ, Aisen P, Peterson R, Weiner MW, Alzheimer's Disease Neuroimaging Initiative. [Relations between brain tissue loss, CSF biomarkers, and the ApoE genetic profile: a longitudinal MRI study](#). Neurobiol Aging, 31(8):1340-54, 2010. PMC2902689
511. Desikan RS, Cabral HJ, Settecase F, Hess CP, Dillon WP, Glastonbury CM, Weiner MW, Schmansky NJ, Salat DH, Fischl B, Alzheimer's Disease Neuroimaging Initiative. [Automated MRI measures predict progression to Alzheimer's disease](#). Neurobiol Aging, 31(8):1364-74, 2010. PMC2902697
512. Chao LL, Rothlind JC, Cardenas VA, Meyerhoff DJ, Weiner MW. [Effects of low-level exposure to sarin and cyclosarin during the 1991 Gulf War on brain function and brain structure in US veterans](#). Neurotoxicology, 31(5): 493-501, 2010. PMC2934883
513. Yushkevich PA, Wang H, Pluta J, Das SR, Craige C, Avants BB, Weiner MW, Mueller S. [Nearly automatic segmentation of hippocampal subfields in vivo focal T2-weighted MRI](#). Neuroimage, 53(4): 1208-24, 2010. PMC2939190
514. Neylan TC, Mueller SG, Wang Z, Metzler TJ, Lenoci M, Truran D, Marmar CR, Weiner MW, Schuff N. [Insomnia Severity Is Associated with a Decreased Volume of the CA3/Dentate Gyrus Hippocampal Subfield](#). Biol Psychiatry, 68(5):494-6, 2010. PMC2921477
515. Wu X, Chen K, Yao L, Ayutyanont N, Langbaum JB, Fleisher A, Reschke C, Lee W, Liu X, Alexander GE, Bandy D, Foster NL, Thompson PM, Harvey DJ, Weiner MW, Koeppen RA, Jagust WJ, Reiman EM, the Alzheimer's Disease Neuroimaging Initiative. [Assessing the reliability to detect cerebral hypometabolism in probable Alzheimer's disease and amnestic mild cognitive impairment](#). J Neurosci Methods, 192(2): 277-85, 2010. PMC2952503
516. Vemuri P, Wiste HJ, Weigand SD, Knopman DS, Trojanowski JQ, Shaw LM, Bernstein MA, Aisen PS, Weiner M, Petersen RC, Jack CR Jr, the Alzheimer's Disease Neuroimaging Initiative. [Serial MRI and CSF biomarkers in normal aging, MCI, and AD](#). Neurology, 75(2):143-51, 2010. PMC2905929

Curriculum Vitae - Michael W. Weiner, M.D.

517. Chou YY, Lepore N, Saharan P, Madsen SK, Hua X, Jack CR, Shaw LM, Trojanowski JQ, Weiner MW, Toga AW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative. [Ventricular maps in 804 ADNI subjects: correlations with CSF biomarkers and clinical decline](#). Neurobiol Aging, 31(8):1386-400, 2010. PMC2904619
518. Desikan RS, Sabuncu MR, Schmansky NJ, Reuter M, Cabral HJ, Hess CP, Weiner MW, Biffi A, Anderson CD, Rosand J, Salat DH, Kemper TL, Dale AM, Sperling RA, Fischl B, the Alzheimer's Disease Neuroimaging Initiative. [Selective Disruption of the Cerebral Neocortex in Alzheimer's Disease](#). PLoS One, 5(9): pii. E12853, 2010. PMC2944799
519. Wang H, Das S, Pluta J, Craige C, Altinay M, Avants B, Weiner M, Mueller S, Yushkevich P. [Standing on the shoulders of giants: improving medical image segmentation via bias correction](#). Med Image Comput Comput Assist Interv, 13(Pt 3): 105-12, 2010. PMC3095022
520. Weiner MW, Aisen PS, Jack CR Jr, Jagust WJ, Trojanowski JQ, Shaw L, Saykin AJ, Morris JC, Cairns N, Beckett LA, Toga A, Green R, Walter S, Soares H, Snyder P, Siemers E, Potter W, Cole PE, Schmidt M, the Alzheimer's Disease Neuroimaging Initiative. [The Alzheimer's Disease Neuroimaging Initiative: progress report and future plans](#). Alzheimer's and Dementia, 6(3): 202-11.e7, 2010. PMC2927112
521. Aisen PS, Petersen RC, Donohue MC, Gamst A, Raman R, Thomas RG, Walter S, Trojanowski JQ, Shaw LM, Beckett LA, Jack CR Jr, Jagust W, Toga AW, Saykin AJ, Morris JC, Green RC, Weiner MW, Alzheimer's Disease Neuroimaging Initiative. [Clinical Core of the Alzheimer's Disease Neuroimaging Initiative: progress and plans](#). Alzheimer's & Dementia, 6(3): 239-46, 2010. PMC2867843
522. Trojanowski JQ, Vandeverticelle H, Korecka M, Clark CM, Aisen PS, Petersen RC, Blennow K, Soares H, Simon A, Lewczuk P, Dean R, Siemers E, Potter WZ, Weiner MW, Jack CR Jr, Jagust W, Toga AW, Lee VM, Shaw LM, Alzheimer's Disease Neuroimaging Initiative. [Update on the biomarker core of the Alzheimer's Disease Neuroimaging Initiative subjects](#). Alzheimer's & Dementia, 6(3):230-8, 2010. PMC2867838
523. Jack CR Jr, Bernstein MA, Borowski BJ, Gunter JL, Fox NC, Thompson PM, Schuff N, Krueger G, Killiany RJ, Decarli CS, Dale AM, Carmichael OW, Tosun D, Weiner MW, Alzheimer's Disease Neuroimaging Initiative. [Update on the magnetic resonance imaging core of the Alzheimer's Disease Neuroimaging Initiative](#). Alzheimer's & Dementia, 6(3):212-20, 2010. PMC2886577
524. Nho K, Shen L, Kim S, Risacher SL, West JD, Foroud T, Jack CR, Weiner MW, Saykin AJ. [Automatic Prediction of Conversion from Mild Cognitive Impairment to Probable Alzheimer's Disease using Structural Magnetic Resonance Imaging](#). AMIA Annu Symp Proc, 542-6, 2010. PMC3041374

Curriculum Vitae - Michael W. Weiner, M.D.

525. Carmichael O, Schwarz C, Drucker D, Fletcher E, Harvey D, Beckett L, Jack CR Jr, Weiner M, DeCarli C; Alzheimer's Disease Neuroimaging Initiative. [Longitudinal changes in white matter disease and cognition in the first year of the Alzheimer disease neuroimaging initiative.](#) Arch Neurol, 67(11):1370-8, 2010. PMC3082636
526. Chiang GC, Insel PS, Tosun D, Schuff N, Truran-Sacrey D, Raptentsetsang ST, Jack CR Jr, Aisen PS, Petersen RC, Weiner MW; For the Alzheimer's Disease Neuroimaging Initiative. [Hippocampal atrophy rates and CSF biomarkers in elderly APOE2 normal subjects.](#) Neurology, 75(22):1976-1981, 2010. PMC3014234
527. Quinn JF, Raman R, Thomas RG, Yurko-Mauro K, Nelson EB, Van Dyck C, Galvin JE, Emond J, Jack Jr CR, Weiner M, Shinto L, Aisen PS. [Docosahexaenoic acid supplementation and cognitive decline in Alzheimer's disease.](#) JAMA, 304(17):1903-11, 2010. PMC3259852
528. Jack CR Jr, Wiste HJ, Vemuri P, Weigand SD, Senjem ML, Zeng G, Bernstein MA, Gunter JL, Pankratz VS, Aisen PS, Weiner MW, Petersen RC, Shaw LM, Trojanowski JQ, Knopman DS; Alzheimer's Disease Neuroimaging Initiative. [Brain beta-amyloid measures and magnetic resonance imaging atrophy both predict time-to-progression from mild cognitive impairment to Alzheimer's disease.](#) Brain, 133(11):3336-48, 2010. PMC2965425
529. Frisoni GB, Weiner MW. [Alzheimer's Disease Neuroimaging Initiative special issue.](#) Neurobiol Aging, 31(8):1259-62, 2010. PMID: 20570400
530. Nezamzadeh M, Wedeen VJ, Wang R, Zhang Y, Zhan W, Young K, Meyerhoff DJ, Weiner MW, Schuff N. [In-vivo investigation of the human cingulum bundle using the optimization of MR diffusion spectrum imaging.](#) European Journal of Radiology, 75(1): e29-36, 2010. PMID: 19615838 PMC In Progress – NIHMSID 163704
531. Tosun D, Mojabi P, Weiner MW, Schuff N. [Joint analysis of structural and perfusion MRI for cognitive assessment and classification of Alzheimer's disease and normal aging.](#) NeuroImage, 52(1):186-97, 2010. PMID: 20406691 PMC In Process – NIHMSID 204697
532. Blennow K, Hampel H, Weiner M, Zetterberg H. [Cerebrospinal fluid and plasma biomarkers in Alzheimer disease.](#) Nat Rev Neurol, 6(3):131-44, 2010. PMID: 20157306
533. Landau SM, Harvey D, Madison CM, Koeppen RA, Reiman EM, Foster NL, Weiner MW, Jagust WJ, the Alzheimer's Disease Neuroimaging Initiative. [Associations between cognitive, functional, and FDG-PET measures of decline in AD and MCI.](#) Neurobiology of Aging, 32(7):1207-18, 2011. PMC2891865
534. Schneider LS, Insel PS, Weiner MW; Alzheimer's Disease Neuroimaging Initiative. [Treatment with cholinesterase inhibitors and memantine of patients in the Alzheimer's Disease Neuroimaging Initiative.](#) Arch Neurol. 68(1):58-66, 2011. PMC3259850

Curriculum Vitae - Michael W. Weiner, M.D.

535. Weiner MW, Meyerhoff DJ, Neylan TC, Hlavin J, Ramage EM, McCoy D, Studholme C, Cardenas V, Marmar C, Truran D, Chu PW, Kornak J, Furlong CE, McCarthy C. [The relationship between Gulf War Illness, brain N-acetylaspartate and post-traumatic stress disorder](#). Military Medicine, 176(8):896-902, 2011. PMC3279571
536. Schuff N, Zhang Y, Zhan W, Lenoci M, Ching C, Boreta L, Mueller SG, Wang Z, Marmar CR, Weiner MW, Neylan TC. [Patterns of Altered Cortical Perfusion and Diminished Subcortical Integrity in Posttraumatic Stress Disorder: A MRI Study](#). NeuroImage, 54 (Suppl 1):S62-8, 2011. PMC2945438
537. Kim S, Swaminathan S, Shen L, Risacher SL, Nho K, Foroud T, Shaw LM, Trojanowski JQ, Potkin SG, Huentelman MJ, Craig DW, Dechairo BM, Aisen PS, Petersen RC, Weiner MW, Saykin AJ; For the Alzheimer's Disease Neuroimaging Initiative. [Genome-wide association study of CSF biomarkers A{beta}1-42, t-tau, and p-tau181p in the ADNI cohort](#). Neurology, 76(1):69-79, 2011. PMC3030225
538. Apfel BA, Ross J, Hlavin J, Meyerhoff DJ, Metzler TJ, Marmar CR, Weiner MW, Schuff N, Neylan TC. [Hippocampal Volume Differences in Gulf War Veterans with Current Versus Lifetime Posttraumatic Stress Disorder Symptoms](#). Biol Psychiatry, 69(6):541-8, 2011. PMC3259803
539. Mueller SG, Ebel A, Barakos J, Scanlon C, Cheong I, Finlay D, Garcia P, Weiner MW, Laxer KD. [Widespread extrahippocampal NAA/\(Cr+Cho\) abnormalities in TLE with and without mesial temporal sclerosis](#). J Neurol, 258(4): 603-12, 2011. PMC3065637
540. Callahan CM, Boustani MA, Weiner M, Beck RA, Livin LR, Kellams JJ, Willis DR, Hendrie HC. [Implementing dementia care models in primary care settings: The Aging Brain Care Medical Home \(Special supplement\)](#). Aging Ment Health, 15(1):5-12, 2011. PMC3030631
541. Jahng GH, Xu S, Weiner MW, Meyerhoff DJ, Park S, Schuff N. [DTI studies in patients with Alzheimer's disease, mild cognitive impairment, or normal cognition with evaluation of the intrinsic background gradients](#). Neuroradiology, 53(10):749-62, 2011. PMC3184226
542. Cardenas VA, Chao LL, Studholme C, Yaffe K, Miller BL, Madison C, Buckley ST, Mungas D, Schuff N, Weiner MW. [Brain atrophy associated with baseline and longitudinal measures of cognition](#). Neurobiology of Aging, 32(4):572-80, 2011. PMC2891686
543. Weigand SD, Vemuri P, Wiste HJ, Senjem ML, Pankratz VS, Aisen PS, Weiner MW, Petersen RC, Shaw LM, Trojanowski JQ, Knopman DS, Jack CR Jr; Alzheimer's Disease Neuroimaging Initiative. [Transforming cerebrospinal fluid Aβ42 measures into calculated Pittsburgh compound B units of brain Aβ amyloid](#). Alzheimers Dement, 7(2):133-141, 2011. PMC3060961
544. Chen K, Ayutyanont N, Langbaum JB, Fleisher AS, Reschke C, Lee W, Liu X, Bandy D, Alexander GE, Thompson PM, Shaw L, Trojanowski JQ, Jack CR Jr, Landau SM, Foster NL,

Curriculum Vitae - Michael W. Weiner, M.D.

- Harvey DJ, Weiner MW, Koeppe RA, Jagust WJ, Reiman EM; Alzheimer's Disease Neuroimaging Initiative. [Characterizing Alzheimer's disease using a hypometabolic convergence index](#). Neuroimage, 56(1): 52-60, 2011. PMC3066300
545. Chen-Plotkin AS, Martinez-Lage M, Sleiman PM, Hu W, Greene R, Wood EM, Bing S, Grossman M, Schellenberg GD, Hatanpaa KJ, Weiner MF, White CL 3rd, Brooks WS, Halliday GM, Kril JJ, Gearing M, Beach TG, Graff-Radford NR, Dickson DW, Rademakers R, Boeve BF, Pickering-Brown SM, Snowden J, van Swieten JC, Heutink P, Seelaar H, Murrell JR, Ghetti B, Spina S, Grafman J, Kaye JA, Woltjer RL, Mesulam M, Bigio E, Lladó A, Miller BL, Alzualde A, Moreno F, Rohrer JD, Mackenzie IR, Feldman HH, Hamilton RL, Cruts M, Engelborghs S, De Deyn PP, Van Broeckhoven C, Bird TD, Cairns NJ, Goate A, Frosch MP, Riederer PF, Bogdanovic N, Lee VM, Trojanowski JQ, Van Deerlin VM. [Genetic and clinical features of progranulin-associated frontotemporal lobar degeneration](#). Arch Neurol, 68(4):488-97, 2011. PMC3160280
546. Vemuri P, Weigand SD, Przybelski SA, Knopman DS, Smith GE, Trojanowski JQ, Shaw LM, Decarli CS, Carmichael O, Bernstein MA, Aisen PS, Weiner M, Petersen RC, Jack CR Jr; on behalf of the Alzheimer's Disease Neuroimaging Initiative. [Cognitive reserve and Alzheimer's disease biomarkers are independent determinants of cognition](#). Brain, 134(Pt 5):1479-92, 2011. PMC3097887
547. Chiang GC, Insel PS, Tosun D, Schuff N, Truran-Sacrey D, Raptentsetsang S, Jack CR Jr, Weiner MW; For the Alzheimer's Disease Neuroimaging Initiative. [Identifying Cognitively Healthy Elderly Individuals with Subsequent Memory Decline by Using Automated MR Temporoparietal Volumes](#). Radiology, 259(3):844-51, 2011. PMC3099048
548. Tosun D, Schuff N, Mathis CA, Jagust W, Weiner MW; Alzheimer's Disease NeuroImaging Initiative. [Spatial patterns of brain amyloid-{beta} burden and atrophy rate associations in mild cognitive impairment](#). Brain, 134(Pt 4):1077-88, 2011. PMC3069703
549. Mueller SG, Chao LL, Berman B, Weiner MW. [Evidence for functional specialization of hippocampal subfields detected by MR subfield volumetry on high resolution images at 4T](#). NeuroImage, 56(3):851-7, 2011. PMC3085574
550. Rosenbloom MH, Alkalay A, Agarwal N, Baker SL, O'Neil JP, Janabi M, Yen IV, Growdon M, Jang J, Madison C, Mormino EC, Rosen HJ, Gorno-Tempini ML, Weiner MW, Miller BL, Jagust WJ, Rabinovici GD. [Distinct clinical and metabolic deficits in PCA and AD are not related to amyloid distribution](#). Neurology. 76(21):1789-96, 2011. PMC3100124
551. Chiang GC, Insel PS, Tosun D, Schuff N, Truran-Sacrey D, Raptentsetsang ST, Thompson PM, Reiman EM, Jack CR Jr, Fox NC, Jagust WJ, Harvey DJ, Beckett LA, Gamst A, Aisen PS, Petersen RC, Weiner MW; Alzheimer's Disease Neuroimaging Initiative. [Impact of apolipoprotein e4-cerebrospinal fluid beta-amyloid interaction on hippocampal volume loss over 1 year in mild cognitive impairment](#). Alzheimers & Dementia, 7(5):514-20, 2011. PMC3177162

Curriculum Vitae - Michael W. Weiner, M.D.

552. Stein JL, Hibar DP, Madsen SK, Khamis M, McMahon KL, de Zubiray GI, Hansell NK, Montgomery GW, Martin NG, Wright MJ, Saykin AJ, Jack CR Jr, Weiner MW, Toga AW, Thompson PM. [Discovery and replication of dopamine-related gene effects on caudate volume in young and elderly populations \(N=1198\) using genome-wide search](#). Mol Psychiatry, 16(9):927-37, 2011. PMC3140560
553. Hibar DP, Stein JL, Kohannim O, Jahanshad N, Saykin AJ, Shen L, Kim S, Pankratz N, Foroud T, Huentelman MJ, Potkin SG, Jack CR Jr, Weiner MW, Toga AW, Thompson PM; Alzheimer's Disease Neuroimaging Initiative. [Voxelwise gene-wide association study \(vGeneWAS\): multivariate gene-based association testing in 731 elderly subjects](#). Neuroimage, 56(4):1875-91, 2011. PMC3366726
554. Rajagopalan P, Hua X, Toga AW, Jack CR Jr, Weiner MW, Thompson PM. [Homocysteine effects on brain volumes mapped in 732 elderly individuals](#). Neuroreport, 22(8):391-5, 2011. PMC3192851
555. Toledo J, Vanderstichele H, Figurski M, Aisen P, Petersen RC, Weiner MW, Jack CR, Jagust W. [Factors affecting A \$\beta\$ plasma levels and their utility as biomarkers in ADNI](#). Acta Neuropathologica, 122(4):401-413, 2011. PMC3299300
556. Ewers M, Sperling RA, Klunk WE, Weiner MW, Hampal H. [Neuroimaging markers for the prediction and early diagnosis of Alzheimer's disease dementia](#). Trends in Neuroscience, 34(8):430-442, 2011. PMC3275347
557. Shen L, Kim S, Qi Y, Inlow M, Swaminathan S, Nho K, Wan J, Risacher SL, Shaw LM, Trojanowski JQ, Weiner MW, Saykin AJ; ADNI. [Identifying Neuroimaging and Proteomic Biomarkers for MCI and AD via the Elastic Net](#). Lect Notes Comput Sci, 7012:27-34, 2011. PMC3202963
558. Wan J, Kim S, Inlow M, Nho K, Swaminathan S, Risacher SL, Fang S, Weiner MW, Beg MF, Wang L, Saykin AJ, Shen L; Alzheimer's Disease Neuroimaging Initiative. [Hippocampal surface mapping of genetic risk factors in AD via sparse learning models](#). Med Image Comput Comput Assist Interv, 14(Pt 2):376-83, 2011. PMC3196668
559. Fleisher AS, Truran D, Mai JT, Langbaum JB, Aisen PS, Cummings JL, Jack CR Jr, Weiner MW, Thomas RG, Schneider LS, Tariot PN; Alzheimer's Disease Cooperative Study. [Chronic divalproex sodium use and brain atrophy in Alzheimer disease](#). Neurology, 77(13):1263-71, 2011. PMC3179645
560. Rankin KP, Mayo MC, Seeley WW, Lee S, Rabinovici G, Gorno-Tempini ML, Boxer AL, Weiner MW, Trojanowski JQ, DeArmond SJ, Miller BL. [Behavioral variant frontotemporal dementia with corticobasal degeneration pathology: phenotypic comparison to bvFTD with Pick's disease](#). J Mol Neurosci, 45(3):594-608, 2011. PMC3208125

Curriculum Vitae - Michael W. Weiner, M.D.

561. Terrando N, Brzezinski M, Degos V, Eriksson LI, Kramer JH, Leung JM, Miller BL, Seeley WW, Vacas S, Weiner MW, Yaffe K, Young WL, Xie Z, Maze M. [Perioperative cognitive decline in the aging population](#). Mayo Clin Proc, 86(9):885-93, 2011. PMC3257991
562. Sabuncu MR, Desikan RS, Sepulcre J, Yeo BT, Liu H, Schmansky NJ, Reuter M, Weiner MW, Buckner RL, Sperling RA, Fischl B; Alzheimer's Disease Neuroimaging Initiative. [The dynamics of cortical and hippocampal atrophy in Alzheimer disease](#). Arch Neurol, 68(8):1040-8, 2011. PMC3248949
563. Lee SE, Rabinovici GD, Mayo MC, Wilson SM, Seeley WW, DeArmond SJ, Huang EJ, Trojanowski JQ, Growdon ME, Jang JY, Sidhu M, See TM, Karydas AM, Gorno-Tempini ML, Boxer AL, Weiner MW, Geschwind MD, Rankin KP, Miller BL. [Clinicopathological correlations in corticobasal degeneration](#). Ann Neurol, 70(2):327-40, 2011. PMC3154081
564. Zhang Y, Schuff N, Ching C, Tosun D, Zhan W, Nezamzadeh M, Rosen HJ, Kramer JH, Gorno-Tempini ML, Miller BL, Weiner MW. [Joint assessment of structural, perfusion, and diffusion MRI in Alzheimer's disease and frontotemporal dementia](#). Int J Alzheimers Dis, 2011:546871, 2011. PMC3132541
565. Cardenas VA, Samuelson K, Lenoci M, Studholme C, Neylan TC, Marmar CR, Schuff N, Weiner MW. [Changes in brain anatomy during the course of posttraumatic stress disorder](#). Psychiatry Res, 193(2):93-100, 2011. PMC3175765
566. Swaminathan S, Kim S, Shen L, Risacher SL, Foroud T, Pankratz N, Potkin SG, Huentelman MJ, Craig DW, Weiner MW, Saykin AJ, The Alzheimer's Disease Neuroimaging Initiative Adni. [Genomic Copy Number Analysis in Alzheimer's Disease and Mild Cognitive Impairment: An ADNI Study](#). Int J Alzheimers Dis, 2011:729478, 2011. PMC3109875
567. Donohue MC, Gamst AC, Thomas RG, Xu R, Beckett L, Petersen RC, Weiner MW, Aisen P; Alzheimer's Disease Neuroimaging Initiative. [The relative efficiency of time-to-threshold and rate of change in longitudinal data](#). Contemp Clin Trials, 32(5):685-93, 2011. PMC3148349
568. Zarow C, Wang L, Chui HC, Weiner MW, Csernansky JG. [MRI shows more severe hippocampal atrophy and shape deformation in hippocampal sclerosis than in Alzheimer's disease](#). Int J Alzheimers Dis, 2011:483972, 2011. PMC3087502
569. Hua X, Gutman B, Boyle C, Rajagopalan P, Leow AD, Yanovsky I, Kumar AR, Toga AW, Jack CR Jr, Schuff N, Alexander GE, Chen K, Reiman EM, Weiner MW, Thompson PM; the Alzheimer's Disease Neuroimaging Initiative. [Accurate measurement of brain changes in longitudinal MRI scans using tensor-based morphometry](#). Neuroimage, 57(1):5-14, 2011. PMC3394184
570. Jack CR Jr, Vemuri P, Wiste HJ, Weigand SD, Aisen PS, Trojanowski JQ, Shaw LM, Bernstein MA, Petersen RC, Weiner MW, Knopman DS; for the Alzheimer's Disease

Curriculum Vitae - Michael W. Weiner, M.D.

Neuroimaging Initiative. [Evidence for Ordering of Alzheimer Disease Biomarkers](#). Arch Neurol, 68(12):1526-1535, 2011. PMC3387980

571. Furney SJ, Simmons A, Breen G, Pedroso I, Lunnon K, Proitsi P, Hodges A, Powell J, Wahlund LO, Kloszewska I, Mecocci P, Soininen H, Tsolaki M, Vellas B, Spenger C, Lathrop M, Shen L, Kim S, Saykin AJ, Weiner MW, Lovestone S. [Genome-wide association with MRI atrophy measures as a quantitative trait locus for Alzheimer's disease](#). Mol Psychiatry, 16(11):1130-8, 2011. PMID: 21116278 PMC In Process – NIHMSID 291997
572. Khachaturian ZS, Petersen RC, Snyder PJ, Khachaturian AS, Aisen P, de Leon M, Greenberg BD, Kukull W, Maruff P, Sperling RA, Stern Y, Touchon J, Vellas B, Andrieu S, Weiner MW, Carrillo MC, Bain LJ. [Developing a global strategy to prevent Alzheimer's disease: Leon Thal Symposium 2010](#). Alzheimer's & Dementia, 7(2):127-32, 2011. PMID: 21414553
573. Lo RY, Hubbard AE, Shaw LM, Trojanowski JQ, Petersen RC, Aisen PS, Weiner MW, Jagust WJ; Alzheimer's Disease Neuroimaging Initiative. [Longitudinal change of biomarkers in cognitive decline](#). Arch Neurol, 68(10):1257-66, 2011. PMID: 21670386
574. Weiner MW, Sadowsky C, Saxton J, Hofbauer RK, Graham SM, Yu SY, Li S, Hsu H-A, Suhy J, Fridman M, Perhach JL. [Magnetic resonance imaging and neuropsychological results from a trial of memantine in Alzheimer's disease](#). Alzheimer's and Dementia, 7(4):425-35, 2011. PMID: 21646051
575. Tariot PN, Schneider LS, Cummings J, Thomas RG, Raman R, Jakimovich LJ, Loy R, Bartocci B, Fleisher A, Ismail S, Porteinsson A, Weiner M, Jack CR, Thal L, Aisen P. [Chronic Divalproex Sodium to Attenuate Agitation and Clinical Progression of Alzheimer Disease](#). Arch Gen Psychiatry, 68(8):853-861, 2011. PMID: 21810649
576. Hampel H, Wilcock G, Andrieu S, Aisen P, Blennow K, Brioche K, Fox NC, Frisoni GB, Lovestone S, Prvulovic D, Sampaio C, Weiner M, Coley N, Vellas B. [Biomarkers for Alzheimer's disease Therapeutic Trials](#). Progress in Neurobiology, 95(4):579-593, 2011. PMID: 21130138
577. Scanlon C, Mueller SG, Tosun D, Cheong I, Garcia P, Barakos J, Weiner MW, Laxer KD. [Impact of methodologic choice for automatic detection of different aspects of brain atrophy by using temporal lobe epilepsy as a model](#). AJNR Am J Neuroradiol, 32(9):1669-76, 2011. PMID: 21852375 PMC3845529
578. Chao LL, Abadjian L, Hlavin J, Meyerhoff DJ, Weiner MW. [Effects of low-level sarin and cyclosarin exposure and Gulf War Illness on brain structure and function: a study at 4T](#). Neurotoxicology, 32(6):814-22, 2011. PMID: 21741405
579. Vellas B, Pesce A, Robert PH, Aisen PS, Ancoli-Israel S, Andrieu S, Cedarbaum J, Dubois B, Siemers E, Spire JP, Weiner MW, May TS. [AMPA workshop on challenges faced by](#)

Curriculum Vitae - Michael W. Weiner, M.D.

investigators conducting Alzheimer's disease clinical trials. Alzheimers Dement, 7(4):e109-17, 2011. PMID: 21784343

580. Westman E, Simmons A, Muehlboeck JS, Mecocci P, Vellas B, Tsolaki M, Kłoszewska I, Soininen H, Weiner MW, Lovestone S, Spenger C, Wahlund LO; AddNeuroMed consortium; Alzheimer's Disease Neuroimaging Initiative. AddNeuroMed and ADNI: similar patterns of Alzheimer's atrophy and automated MRI classification accuracy in Europe and North America. Neuroimage, 58(3):818-28, 2011. PMID: 21763442
581. Weiner MW. Commentary on "Biomarkers in Alzheimer's disease drug development." The view from ADNI. Alzheimer's and Dementia, 7(3):e45-7, 2011. PMID: 21575867
582. Coley N, Andrieu S, Jaros M, Weiner M, Cedarbaum J, Vellas B. Suitability of the Clinical Dementia Rating-Sum of Boxes as a single primary endpoint for Alzheimer's disease trials. Alzheimers Dement, 7(6):602-610, 2011. PMID: 21745761
583. Woolley SC, Zhang Y, Schuff N, Weiner MW, Katz JS. Neuroanatomical correlates of apathy in ALS using 4 Tesla diffusion tensor MRI. Amyotrophic Lateral Sclerosis, 12(1):52-8, 2011. PMID: 21271791
<http://www.ncbi.nlm.nih.gov/pubmed/21271791>
584. Zhang Y, Schuff N, Woolley SC, Chiang GC, Boreta L, Laxamana J, Katz JS, Weiner MW. Progression of white matter degeneration in amyotrophic lateral sclerosis: A diffusion tensor imaging study. Amyotroph Lateral Scler, 12(6):421-9, 2011. PMID: 21745124 PMC3804304
<http://www.ncbi.nlm.nih.gov/pubmed/21745124>
585. Tosun D, Schuff N, Shaw LM, Trojanowski JQ, Weiner MW; Alzheimer's Disease NeuroImaging Initiative. Relationship between CSF biomarkers of Alzheimer's disease and rates of regional cortical thinning in ADNI data. J Alzheimers Dis, 26 Suppl 3:77-90, 2011. PMID: 21971452
<http://www.ncbi.nlm.nih.gov/pubmed/21971452>
586. Schuff N, Tosun D, Insel PS, Chiang GC, Truran D, Aisen PS, Jack CR Jr, Weiner MW, Alzheimer's Disease Neuroimaging Initiative. Nonlinear time course of brain volume loss in cognitively normal and impaired elders. Neurobiol Aging, 33(5):845-55, 2012. PMC3032014
587. Tosun D, Rosen H, Miller BL, Weiner MW, Schuff N. MRI patterns of atrophy and hypoperfusion associations across brain regions in frontotemporal dementia. Neuroimage, 59(3):2098-109, 2012. PMC3254855
588. Zheng L, Mack WJ, Chui HC, Hefflin L, Mungas D, Reed B, DeCarli C, Weiner MW, Kramer JH. Coronary artery disease is associated with cognitive decline independent of changes on magnetic resonance imaging in cognitively normal elderly adults. J Am Geriatr Soc, 60(3):499-504, 2012. PMC3302932

Curriculum Vitae - Michael W. Weiner, M.D.

589. Mueller SG, Laxer KD, Scanlon C, Garcia P, McMullen WJ, Loring DW, Meador KJ, Weiner MW. [Different structural correlates for verbal memory impairment in temporal lobe epilepsy with and without mesial temporal lobe sclerosis](#). Human Brain Mapping, 33(2):489-99, 2012. PMC3259857
590. Ewers M, Insel P, Jagust WJ, Shaw L, Trojanowski J JQ, Aisen P, Petersen RC, Schuff N, Weiner MW; for the Alzheimer's Disease Neuroimaging Initiative (ADNI). [CSF Biomarker and PIB-PET-Derived Beta-Amyloid Signature Predicts Metabolic, Gray Matter, and Cognitive Changes in Nondemented Subjects](#). Cereb Cortex, 22(9):1993-2004, 2012. PMC3500862
591. Marchant NL, Reed BR, Decarli CS, Madison CM, Weiner MW, Chui HC, Jagust WJ. [Cerebrovascular disease, beta-amyloid, and cognition in aging](#). Neurobiol Aging, 33(5):1006.e25-36, 2012. PMC3274647
592. Swaminathan S, Shen L, Risacher SL, Yoder KK, West JD, Kim S, Nho K, Foroud T, Inlow M, Potkin SG, Huentelman MJ, Craig DW, Jagust WJ, Koeppe RA, Mathis CA, Jack CR Jr, Weiner MW, Saykin AJ; the Alzheimer's Disease Neuroimaging Initiative (ADNI). [Amyloid pathway-based candidate gene analysis of \[\(11\)C\]PiB-PET in the Alzheimer's Disease Neuroimaging Initiative \(ADNI\) cohort](#). Brain Imaging Behav, 6(1):1-15, 2012. PMC3256261
593. Villemagne VL, Klunk WE, Mathis CA, Rowe CC, Brooks DJ, Hyman BT, Ikonomovic MD, Ishii K, Jack CR, Jagust WJ, Johnson KA, Koeppe RA, Lowe VJ, Masters CL, Montine TJ, Morris JC, Nordberg A, Petersen RC, Reiman EM, Selkoe DJ, Sperling RA, Van Laere K, Weiner MW, Drzezga A. [\$\beta\$ Imaging: feasible, pertinent, and vital to progress in Alzheimer's disease](#). Eur J Nucl Med Mol Imaging, 39(2):209-19, 2012. PMC3261395
594. Ewers M, Walsh C, Trojanowski JQ, Shaw LM, Petersen RC, Jack CR Jr, Feldman HH, Bokde AL, Alexander GE, Scheltens P, Vellas B, Dubois B, Weiner M, Hampel H; North American Alzheimer's Disease Neuroimaging Initiative (ADNI). [Prediction of conversion from mild cognitive impairment to Alzheimer's disease dementia based upon biomarkers and neuropsychological test performance](#). Neurobiology of Aging, 33(7):1203-1214.e2, 2012. PMC3328615
595. Weiner MW, Veitch DP, Aisen PS, Beckett LA, Cairns NJ, Green RC, Harvey D, Jack CR, Jagust W, Liu E, Morris JC, Petersen RC, Saykin AJ, Schmidt ME, Shaw L, Siuciak JA, Soares H, Toga AW, Trojanowski JQ; Alzheimer's Disease Neuroimaging Initiative. [The Alzheimer's Disease Neuroimaging Initiative: A review of papers published since its inception](#). Alzheimers Dement, 8(1 Suppl):S1-68, 2012. PMC3329969
596. Kohannim O, Hibar DP, Stein JL, Jahanshad N, Hua X, Rajagopalan P, Toga AW, Jack CR Jr, Weiner MW, de Zubicaray GI, McMahon KL, Hansell NK, Martin NG, Wright MJ, Thompson PM; Alzheimer's Disease Neuroimaging Initiative. [Discovery and Replication of Gene Influences on Brain Structure Using LASSO Regression](#). Front Neurosci, 6:115, 2012. PMC3412288

Curriculum Vitae - Michael W. Weiner, M.D.

597. Zarow C, Weiner MW, Ellis WG, Chui HC. [Prevalence, laterality, and comorbidity of hippocampal sclerosis in an autopsy sample](#). Brain Behav, 2(4):435-42, 2012. PMC3432966
598. Lee GJ, Lu PH, Hua X, Lee S, Wu S, Nguyen K, Teng E, Leow AD, Jack CR Jr, Toga AW, Weiner MW, Bartzokis G, Thompson PM; Alzheimer's Disease Neuroimaging Initiative. [Depressive symptoms in mild cognitive impairment predict greater atrophy in Alzheimer's disease-related regions](#). Biol Psychiatry, 71(9):814-21, 2012. PMC3322258
599. Lee JY, Insel P, Mackin RS, Schuff N, Chui H, Decarli C, Park KH, Mueller SG, Weiner MW. [Different associations of white matter lesions with depression and cognition](#). BMC Neurol, 12(1):83, 2012. PMC3482604
600. Durazzo TC, Insel PS, Weiner MW; Alzheimer Disease Neuroimaging Initiative. [Greater regional brain atrophy rate in healthy elderly subjects with a history of cigarette smoking](#). Alzheimers Dement, 8(6):513-9, 2012. PMC3484322
601. Nir T, Jahanshad N, Jack CR, Weiner MW, Toga AW, Thompson PM; the Alzheimer's Disease Neuroimaging Initiative (ADNI). [Small World Network Measures Predict White Matter Degeneration In Patients With Early-Stage Mild Cognitive Impairment](#). Proc IEEE Int Symp Biomed Imaging, 2012:1405-1408, 2012. PMC3420972
602. Kohannim O, Hibar DP, Jahanshad N, Stein JL, Hua X, Toga AW, Jack CR Jr, Weiner MW, Thompson PM; the Alzheimer's Disease Neuroimaging Initiative. [Predicting Temporal Lobe Volume On Mri From Genotypes Using L\(1\)-L\(2\) Regularized Regression](#). Proc IEEE Int Symp Biomed Imaging. 2012:1160-1163. PMC3420969
603. Morris JC, Aisen PS, Bateman RJ, Benzinger TL, Cairns NJ, Fagan AM, Ghetti B, Goate AM, Holtzman DM, Klunk WE, McDade E, Marcus DS, Martins RN, Masters CL, Mayeux R, Oliver A, Quaid K, Ringman JM, Rossor MN, Salloway S, Schofield PR, Selsor NJ, Sperling RA, Weiner MW, Xiong C, Moulder KL, Buckles VD. Developing an international network for Alzheimer research: The Dominantly Inherited Alzheimer Network. Clin Investig (Lond), 2(10):975-984, 2012. PMC3489185
<http://www.ncbi.nlm.nih.gov/pubmed/23139856>
604. Hurko O, Black SE, Doody R, Doraiswamy PM, Gamst A, Kaye J, Obisesan TO, Rusinek H, Scharre D, Sperling R, Weiner MW, Green RC; for the ADNI Data and Publication Committee. [The ADNI Publication Policy: Commensurate recognition of critical contributors who are not authors](#). Neuroimage, 59(4):4196-200, 2012. PMID: 22100665 PMC3676932
605. Liu Y, Zhu X, Feinberg D, Guenther M, Gregori J, Weiner MW, Schuff N. [Arterial spin labeling MRI study of age and gender effects on brain perfusion hemodynamics](#). Magn Reson Med, 68(3):912-22, 2012. PMID: 22139957

Curriculum Vitae - Michael W. Weiner, M.D.

606. Stein JL, et al (and 207 other authors). [Identification of common variants associated with human hippocampal and intracranial volumes](#). Nat Genet, 44(5):552-61, 2012. PMID: 22504417
607. Zhan W, Kang GA, Glass GA, Zhang Y, Shirley C, Millin R, Possin KL, Nezamzadeh M, Weiner MW, Marks WJ Jr, Schuff N. [Regional alterations of brain microstructure in parkinson's disease using diffusion tensor imaging](#). Mov Disord, 27(1):90-7, 2012. PMID: 21850668 PMCID3635491
608. Mackin RS, Insel P, Aisen PS, Geda YE, Weiner MW. [Longitudinal stability of subsyndromal symptoms of depression in individuals with mild cognitive impairment: relationship to conversion to dementia after 3 years](#). Int J Geriatr Psychiatry, 27(4):355-363, 2012. PMID: 21744390 PMC3685477
609. Das SR, Avants BB, Pluta J, Wang H, Suh JW, Weiner MW, Mueller SG, Yushkevich PA. [Measuring longitudinal change in the hippocampal formation from in vivo high-resolution T2-weighted MRI](#). Neuroimage, 60(2):1266-79, 2012. PMID: 22306801 PMC3667607
610. Seo SW, Lee JM, Im K, Park JS, Kim SH, Kim ST, Ahn HJ, Chin J, Cheong HK, Weiner MW, Na DL. [Cortical thinning related to periventricular and deep white matter hyperintensities](#). Neurobiol Aging, 33(7):1156-1167.e1, 2012. PMID: 21316813
611. Jack CR Jr, Vemuri P, Wiste HJ, Weigand SD, Lesnick TG, Lowe V, Kantarci K, Bernstein MA, Senjem ML, Gunter JL, Boeve BF, Trojanowski JQ, Shaw LM, Aisen PS, Weiner MW, Petersen RC, Knopman DS; for the Alzheimer's Disease Neuroimaging Initiative. [Shapes of the Trajectories of 5 Major Biomarkers of Alzheimer Disease](#). Arch Neurol, 69(7):856-67, 2012. PMID: 22409939 PMC3595157
612. Chiang GC, Zhan W, Schuff N, Weiner MW. [White Matter Alterations in Cognitively Normal apoE {varepsilon}2 Carriers: Insight into Alzheimer Resistance?](#) AJNR Am J Neuroradiol, 33(7):1392-7, 2012. PMID: 22383234 PMC3951461
613. Carrillo MC, Bain LJ, Frisoni GB, Weiner MW. [Worldwide Alzheimer's disease neuroimaging initiative](#). Alzheimers Dement, 8(4):337-42, 2012. PMID: 22748939
614. Cardenas VA, Reed B, Chao LL, Chui H, Sanossian N, Decarli CC, Mack W, Kramer J, Hodis HN, Yan M, Buonocore MH, Carmichael O, Jagust WJ, Weiner MW. [Associations Among Vascular Risk Factors, Carotid Atherosclerosis, and Cortical Volume and Thickness in Older Adults](#). Stroke, 43(11):2865-70, 2012. PMID: 22984010 PMC3732460
615. Zhang Y, Tartaglia MC, Schuff N, Chiang GC, Ching C, Rosen HJ, Gorno-Tempini ML, Miller BL, Weiner MW. [MRI Signatures of Brain Macrostructural Atrophy and Microstructural Degradation in Frontotemporal Lobar Degeneration Subtypes](#). J Alzheimers Dis, 33(2):431-44, 2012. PMID: 22976075 PMC3738303

Curriculum Vitae - Michael W. Weiner, M.D.

616. Hua X, Hibar DP, Ching CR, Boyle CP, Rajagopalan P, Gutman BA, Leow AD, Toga AW, Jack CR Jr, Harvey D, Weiner MW, Thompson PM; the Alzheimer's Disease Neuroimaging Initiative. [Unbiased tensor-based morphometry: Improved robustness and sample size estimates for Alzheimer's disease clinical trials](#). Neuroimage, (66):648-661, 2012. PMID: 23153970 PMC3785376
617. Landau SM, Mintun MA, Joshi AD, Koeppe RA, Petersen RC, Aisen PS, Weiner MW, Jagust WJ; for the Alzheimer's Disease Neuroimaging Initiative. [Amyloid deposition, hypometabolism, and longitudinal cognitive decline](#). Ann Neurol, 72(4):578-586, 2012. PMID: 23109153 PMC3786871
618. Toledo JB, Toledo E, Weiner MW, Jack CR Jr, Jagust W, Lee VM, Shaw LM, Trojanowski JQ; Alzheimer's Disease Neuroimaging Initiative. [Cardiovascular risk factors, cortisol, and amyloid- \$\beta\$ deposition in Alzheimer's Disease Neuroimaging Initiative](#). Alzheimers Dement, 8(6):483-9, 2012. PMID: 23102118 PMC3668456
619. Crane PK, Carle A, Gibbons LE, Insel P, Mackin RS, Gross A, Jones RN, Mukherjee S, Curtis SM, Harvey D, Weiner M, Mungas D; for the Alzheimer's Disease Neuroimaging Initiative. [Development and assessment of a composite score for memory in the Alzheimer's Disease Neuroimaging Initiative \(ADNI\)](#). Brain Imaging Behav, 6(4):502-516, 2012. PMID: 22782295 PMC3806057
620. Adamson MM, Bayley PJ, Scanlon BK, Farrell ME, Hernandez B, Weiner MW, Yesavage JA, Taylor JL. Pilot expertise and hippocampal size: associations with longitudinal flight simulator performance. Aviat Space Environ Med, 83(9):850-7, 2012 Sept. PMID: 22946348 <http://www.ncbi.nlm.nih.gov/pubmed/22946348>
621. Ramanan VK, Kim S, Holohan K, Shen L, Nho K, Risacher SL, Foroud TM, Mukherjee S, Crane PK, Aisen PS, Petersen RC, Weiner MW, Saykin AJ; for the Alzheimer's Disease Neuroimaging Initiative (ADNI). [Genome-wide pathway analysis of memory impairment in the Alzheimer's Disease Neuroimaging Initiative \(ADNI\) cohort implicates gene candidates, canonical pathways, and networks](#). Brain Imaging Behav, 6(4):634-648, 2012 Dec. PMID: 22865056 PMC3713637
622. Mackin RS, Tosun D, Mueller SG, Schuff N, Lee JY, Insel P, Truran-Sacrey D, Arean PA, Nelson JC, Weiner MW. [Patterns of reduced cortical thickness in late life depression and relationship to psychotherapeutic response](#). Am J Geriatr Psychiatry, [Epub ahead of print], 2013. PMID: 23567394 PMC3732520
623. Hibar DP, Stein JL, Ryles AB, Kohannim O, Jahanshad N, Medland SE, Hansell NK, McMahon KL, de Zubicaray GI, Montgomery GW, Martin NG, Wright MJ, Saykin AJ, Jack CR Jr, Weiner MW, Toga AW, Thompson PM; the Alzheimer's Disease Neuroimaging Initiative. [Genome-wide association identifies genetic variants associated with lentiform nucleus volume in N = 1345 young and elderly subjects](#). Brain Imaging Behav, [Epub ahead of print] 2012 Aug 18. PMID: 22903471 PMC3779070

Curriculum Vitae - Michael W. Weiner, M.D.

624. Rajagopalan P, Jahanshad N, Stein JL, Hua X, Madsen SK, Kohannim O, Hibar DP, Toga AW, Jack CR, Saykin AJ, Green R, Weiner MW, Bis JC, Kuller LH, Riverol M, Becker JT, Lopez OL, the Alzheimer's Disease Neuroimaging Initiative (ADNI) and the Cardiovascular Health Study (CHS). [Common folate gene variant, MTHFR C677T, is associated with brain structure in two independent cohorts of people with mild cognitive impairment](#). NeuroImage: Clinical. 1(1): 179-187. 2012 PMID: 24179750 PMC3757723
625. Mackin RS, Insel P, Tosun D, Mueller SG, Schuff N, Truran-Sacrey D, Raptentsetsang ST, Lee JY, Jack CR Jr, Aisen PS, Petersen RC, Weiner MW; the Alzheimer's Disease Neuroimaging Initiative. [The Effect of Subsyndromal Symptoms of Depression and White Matter Lesions on Disability for Individuals With Mild Cognitive Impairment](#). Am J Geriatr Psychiatry, [Epub ahead of print], 2013. PMID: 23567388
626. Wyman BT, Harvey DJ, Crawford K, Bernstein MA, Carmichael O, Cole PE, Crane PK, Decarli C, Fox NC, Gunter JL, Hill D, Killiany RJ, Pachai C, Schwarz AJ, Schuff N, Senjem ML, Suhy J, Thompson PM, Weiner M, Jack CR Jr; Alzheimer's Disease Neuroimaging Initiative. [Standardization of analysis sets for reporting results from ADNI MRI data](#). Alzheimers Dement, [Epub ahead of print], 2013 May. PMID: 23110865 PMC3891834
627. Haldar JP, Wedeen VJ, Nezamzadeh M, Dai G, Weiner MW, Schuff N, Liang ZP. [Improved diffusion imaging through SNR-enhancing joint reconstruction](#). Magn Reson Med, 69(1):277-89, 2013. PMC3407310
628. Rajagopalan P, Refsum H, Hua X, Toga AW, Jack CR Jr, Weiner MW, Thompson PM; Alzheimer's Disease Neuroimaging Initiative. [Mapping creatinine- and cystatin C-related white matter brain deficits in the elderly](#). Neurobiol Aging, 34(4):1221-30, 2013. PMID: 23182131 PMC3603573
629. Jack CR Jr, Knopman DS, Jagust WJ, Petersen RC, Weiner MW, Aisen PS, Shaw LM, Vemuri P, Wiste HJ, Weigand SD, Lesnick TG, Pankratz VS, Donohue MC, Trojanowski JQ. [Tracking pathophysiological processes in Alzheimer's disease: an updated hypothetical model of dynamic biomarkers](#). Lancet Neurol, 12(2):207-16, 2013. PMID: 23332364 PMC3622225
630. Rajagopalan P, Toga AW, Jack CR, Weiner MW, Thompson PM; for the Alzheimer's Disease Neuroimaging Initiative. [Fat-mass-related hormone, plasma leptin, predicts brain volumes in the elderly](#). Neuroreport, 24(2):58-62, 2013. PMC3635486
631. Lehmann M, Ghosh PM, Madison C, Laforce R Jr, Corbetta-Rastelli C, Weiner MW, Greicius MD, Seeley WW, Gorno-Tempini ML, Rosen HJ, Miller BL, Jagust WJ, Rabinovici GD. [Diverging patterns of amyloid deposition and hypometabolism in clinical variants of probable Alzheimer's disease](#). Brain, 136(Pt 3):844-58, 2013. PMID: 23358601 PMC3580269
632. Gutman BA, Hua X, Rajagopalan P, Chou YY, Wang Y, Yanovsky I, Toga AW, Jack CR Jr, Weiner MW, Thompson PM; for the Alzheimer's Disease Neuroimaging Initiative.

Curriculum Vitae - Michael W. Weiner, M.D.

[Maximizing power to track Alzheimer's disease and MCI progression by LDA-based weighting of longitudinal ventricular surface features](#). Neuroimage, 70:386-401, 2013. PMID: 23296188 PMC3942253

633. Weiner MW. Dementia in 2012: Further insights into Alzheimer disease pathogenesis. Nat Rev Neurol, 9(2):65-6, 2013. PMID 23338285
<http://www.ncbi.nlm.nih.gov/pubmed/23338285>
634. Daianu M, Jahanshad N, Nir TM, Toga AW, Jack CR Jr, Weiner MW, Thompson PM; Alzheimer's Disease Neuroimaging Initiative. Breakdown of brain connectivity between normal aging and Alzheimer's disease: a structural k-core network analysis. Brain Connectivity, 3(4):407-22. 2013. PMID: 23701292 PMC3749712
<http://www.ncbi.nlm.nih.gov/pubmed/23701292>
635. Kantarci K, Gunter JL, Tosakulwong N, Weigand SD, Senjem MS, Petersen RC, Aisen PS, Jagust WJ, Weiner MW, Jack CR Jr; Alzheimer's Disease Neuroimaging Initiative. [Focal hemosiderin deposits and β-amyloid load in the ADNI cohort](#). Alzheimers Dement, [Epub ahead of print], 2013 Jan 30. PMID: 23375568 PMC3770782
636. Merchant NL, Reed BR, Sanossian N, Madison CM, Kriger S, Dhada R, Mack WJ, Decarli C, Weiner MW, Mungas DM, Chui HC, Jagust WJ. [The Aging Brain and Cognition: Contribution of Vascular Injury and Aβ to Mild Cognitive Dysfunction](#). JAMA Neurol, 70(4):488-95, 2013 Feb 11. PMID: 23400560 PMC3771392
637. Naylor MG, Cardenas VA, Tosun D, Schuff N, Weiner M, Schwartzman A. Voxelwise multivariate analysis of multimodality magnetic resonance imaging. Hum Brain Mapp. [Epub ahead of print] 2013 Feb 13. PMID: 23408378
<http://www.ncbi.nlm.nih.gov/pubmed/23408378>
638. Ramanan VK, Risacher SL, Nho K, Kim S, Swaminathan S, Shen L, Foroud TM, Hakonarson H, Huentelman MJ, Aisen PS, Petersen RC, Green RC, Jack CR, Koeppe RA, Jagust WJ, Weiner MW, Saykin AJ. [APOE and BCHE as modulators of cerebral amyloid deposition: a florbetapir PET genome-wide association study](#). Mol Psychiatry, [Epub ahead of print] 2013 Feb 19. PMID: 23419831 PMC3661739
639. Cardenas VA, Tosun D, Chao LL, Fletcher PT, Joshi S, Weiner MW, Schuff N. [Voxel-Wise Co-analysis of Macro- and Microstructural Brain Alteration in Mild Cognitive Impairment and Alzheimer's Disease Using Anatomical and Diffusion MRI](#). J Neuroimaging, [Epub ahead of print] 2013 Feb 19. PMID: 23421601 PMC3951683
640. Roussotte FF, Jahanshad N, Hibar DP, Sowell ER, Kohannim O, Barysheva M, Hansell NK, McMahon KL, de Zubicaay GI, Montgomery GW, Martin NG, Wright MJ, Toga AW, Jack Jr CR, Weiner MW, Thompson PM; and the ADNI. [A commonly carried genetic variant in the delta opioid receptor gene, OPRD1, is associated with smaller regional brain volumes:](#)

Curriculum Vitae - Michael W. Weiner, M.D.

Replication in elderly and young populations. Hum Brain Mapp, [Epub ahead of print] 2013 Feb 21. PMID: 23427138 PMC4046708

641. Protas HD, Chen K, Langbaum JB, Fleisher AS, Alexander GE, Lee W, Bandy D, de Leon MJ, Mosconi L, Buckley S, Truran-Sacrey D, Schuff N, Weiner MW, Caselli RJ, Reiman EM. Posterior cingulate glucose metabolism, hippocampal glucose metabolism, and hippocampal volume in cognitively normal, late-middle-aged persons at 3 levels of genetic risk for Alzheimer disease. *JAMA Neurology*, 70(3):320-5. 2013 Mar 1. PMID: 23599929 PMC3745014 <http://www.ncbi.nlm.nih.gov/pubmed/23599929>
642. Ewers M, Insel PS, Stern Y, Weiner MW, Alzheimer's Disease Neuroimaging Initiative (ADNI). Cognitive reserve associated with FDG-PET in preclinical Alzheimer 's disease. *Neurology*, 80(13):1194-201, [Epub ahead of print] 2013 Mar 13. PMID: 23486873 PMC3691784 <http://www.ncbi.nlm.nih.gov/pubmed/23486873>
643. Jahanshad N, Rajagopalan P, Hua X, Hibar DP, Nir TM, Toga AW, Jack CR Jr, Saykin AJ, Green RC, Weiner MW, Medland SE, Montgomery GW, Hansell NK, McMahon KL, de Zubiray GI, Martin NG, Wright MJ, Thompson PM; Alzheimer's Disease Neuroimaging Initiative. Genome-wide scan of healthy human connectome discovers SPON1 gene variant influencing dementia severity. *Proc Natl Acad Sci U S A*, 110(12):4768-73, 2013 Mar 19. PMID: 23471985 PMC3606977 <http://www.ncbi.nlm.nih.gov/pubmed/23471985>
644. Swaminathan S, Risacher SL, Yoder KK, West JD, Shen L, Kim S, Inlow M, Foroud T, Jagust WJ, Koeppe RA, Mathis CA, Shaw LM, Trojanowski JQ, Soares H, Aisen PS, Petersen RC, Weiner MW, Saykin AJ; Alzheimer's Disease Neuroimaging Initiative. Association of plasma and cortical amyloid beta is modulated by APOE ε4 status. *Alzheimers Dement*, [Epub ahead of print], 2013 Mar 26. PMID: 23541187 PMC3750076 <http://www.ncbi.nlm.nih.gov/pubmed/23541187>
645. Risacher SL, Kim S, Shen L, Nho K, Foroud T, Green RC, Petersen RC, Jack CR Jr, Aisen PS, Koeppe RA, Jagust WJ, Shaw LM, Trojanowski JQ, Weiner MW, Saykin AJ; Alzheimer's Disease Neuroimaging Initiative. The role of apolipoprotein E (APOE) genotype in early mild cognitive impairment (E-MCI). *Front Aging Neurosci*, 5:11, 2013 Apr 1. PMID: 23554593 PMC3612590 <http://www.ncbi.nlm.nih.gov/pubmed/23554593>
646. Lam F, Babacan SD, Haldar JP, Weiner MW, Schuff N, Liang ZP. Denoising diffusion-weighted magnitude MR images using rank and edge constraints. *Magn Reson Med*. [Epub ahead of print] 2013 Apr 8. PMID: 23568755 PMC3796128 <http://www.ncbi.nlm.nih.gov/pubmed/23568755>
647. Park JH, Seo SW, Changsoo K, Kim GH, Noh HJ, Kim ST, Kwak KC, Yoon U, Lee JM, Lee JW, Shin J, Kim CH, Noh Y, Cho H, Kim HJ, Yoon CW, Oh SJ, Kim JS, Choe YS, Lee KH, Lee JH, Ewers M, Weiner MW, Werring DJ and Na DL. Pathogenesis of cerebral microbleeds: in vivo imaging of amyloid and subcortical ischemic small vessel disease in 226

Curriculum Vitae - Michael W. Weiner, M.D.

- individuals with cognitive impairment. Ann Neurol, 73(5):584-93. [Epub ahead of print] 2013 May. PMID: 23495089 <http://www.ncbi.nlm.nih.gov/pubmed/23495089>
648. Madsen S, Gutman BA, Joshi SH, Toga AW, Jack Jr. CR, Weiner MW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative (ADNI). Relating longitudinal ventricular expansion to cortical gray matter thinning in the elderly, submitted to the Neurobiology of Aging (Special Issue on Novel Imaging Biomarkers for Alzheimer's Disease and Related Disorders), 2013 May 1.
649. Hibar D, Stein JL, Jahanshad N, Kohannim O, Hua X, Toga AW, McMahon KL, de Zubicaray GI, Martin NG, Wright MJ, Weiner MW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative (ADNI). Genome-wide interaction analysis reveals replicated epistatic effects on brain structure, submitted to the Neurobiology of Aging (Special Issue on Novel Imaging Biomarkers for Alzheimer's Disease and Related Disorders), 2013 May 1. PMID: 25264344
650. Jahanshad N, Nir TM, Toga AW, Jack Jr. CR., Weiner MW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative (ADNI). Seemingly Unrelated Regression empowers detection of network failure in dementia, submitted to the Neurobiology of Aging (Special Issue on Novel Imaging Biomarkers for Alzheimer's Disease and Related Disorders), 2013 May 1.
651. Nir TM, Jahanshad N, Toga AW, Jack Jr. CR, Weiner MW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative (ADNI). Connectivity network measures predict volumetric atrophy in mild cognitive impairment, submitted to the Neurobiology of Aging (Special Issue on Novel Imaging Biomarkers for Alzheimer's Disease and Related Disorders), 2013 May 1.
652. Nir TM, Villalon-Reina JE, Prasad G, Jahanshad N, Joshi SH, Toga AW, Bernstein MA, Jack Jr. CR., Weiner MW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative (ADNI). DTI--based maximum density path analysis and SVM classification of Alzheimer's disease, submitted to the Neurobiology of Aging (Special Issue on Novel Imaging Biomarkers for Alzheimer's Disease and Related Disorders), 2013 May 1.
653. Ching C, Hua X, Hibar DP, Ward CP, Gunter JL, Bernstein MA, Jack Jr CR, Weiner MW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative (ADNI). DOES MRI SCAN ACCELERATION AFFECT POWER TO TRACK BRAIN CHANGE? submitted to the Neurobiology of Aging (Special Issue on Novel Imaging Biomarkers for Alzheimer's Disease and Related Disorders), 2013 May 1.
654. Tosun D, Joshi S, Weiner MW. Neuroimaging predictors of brain amyloidosis in mild cognitive impairment. Annals of Neurology, 2013 May 8 [Epub ahead of print]. PMID: 23686534 <http://www.ncbi.nlm.nih.gov/pubmed/23686534>
655. Zhang Y, Schuff N, Camacho M, Chao LL, Fletcher TP, Yaffe K, Woolley SC, Madison C, Rosen HJ, Miller BL, Weiner MW. MRI Markers for Mild Cognitive Impairment:

Curriculum Vitae - Michael W. Weiner, M.D.

Comparisons between White Matter Integrity and Gray Matter Volume Measurements. PLoS ONE, 8(6): e66367. 2013 June 6. PMID: 23762488 PMC3675142

656. Chao LL, Decarli C, Kriger S, Truran D, Zhang Y, Laxamana J, Villeneuve S, Jagust WJ, Sanossian N, Mack WJ, Chui HC, Weiner MW. Associations between White Matter Hyperintensities and β Amyloid on Integrity of Projection, Association, and Limbic Fiber Tracts Measured with Diffusion Tensor MRI. PLoS One; 8(6):e65175. 2013 June 6. PMID: 23762308 PMC3675157 <http://www.ncbi.nlm.nih.gov/pubmed/23762308>
657. Kohannim O, Hua X, Rajagopalan P, Hibar DP, Jahanshad N, Grill JD, Apostolova LG, Toga AW, Jack CR Jr, Weiner MW, Thompson PM; Alzheimer's Disease Neuroimaging Initiative. Multilocus genetic profiling to empower drug trials and predict brain atrophy. NeuroImage: Clinical, 2:827-35. 2013 June 13. PMID: 24179834 PMC3777716 <http://www.ncbi.nlm.nih.gov/pubmed/24179834>
658. Yan X, Brown AD, Lazar M, Cressman VL, Henn-Haase C, Neylan TC, Shalev A, Wolkowitz OM, Hamilton SP, Yehuda R, Sodickson DK, Weiner MW, Marmar CR. Spontaneous brain activity in combat related PTSD. Neuroscience Letters, 547:1-5. 2013 Jun 28. PMID: 23643995 <http://www.ncbi.nlm.nih.gov/pubmed/23643995>
659. Weiner MW, Friedl KE, Pacifico A, Chapman JC, Jaffee MS, Little DM, Manley GT, McKee A, Petersen RC, Pitman RK, Yaffe K, Zetterberg H, Obana R, Bain LJ, Carrillo MC. Military risk factors for Alzheimer's disease. Alzheimer's & Dementia, 9(4):445-451. 2013 July. PMID: 23809365 <http://www.ncbi.nlm.nih.gov/pubmed/23809365>
660. Kim S, Swaminathan S, Inlow M, Risacher SL, Nho K, Shen L, Foroud TM, Petersen RC, Aisen PS, Soares H, Toledo JB, Shaw LM, Trojanowski JQ, Weiner MW, McDonald BC, Farlow MR, Ghetti B, Saykin AJ, for the Alzheimer's Disease Neuroimaging Initiative (ADNI). Influence of Genetic Variation on Plasma Protein Levels in Older Adults Using a Multi-Analyte Panel. PLoS ONE, 8(7). 2013 July 23. PMID: 23894628 PMC3720913 <http://www.ncbi.nlm.nih.gov/pubmed/23894628>
661. Nir TM, Jahanshad N, Villalon-Reina JE, Toga AW, Jack CR, Weiner MW, Thompson PM; Alzheimer's Disease Neuroimaging Initiative (ADNI). Effectiveness of regional DTI measures in distinguishing Alzheimer's disease, MCI, and normal aging. NeuroImage: Clinical, 3:180-95. 2013 July 27. PMID: 24179862 PMC3792746 <http://www.ncbi.nlm.nih.gov/pubmed/24179862>
662. Frisoni GB, Bocchetta M, Chételat G, Rabinovici GD, de Leon MJ, Kaye J, Reiman EM, Scheltens P, Barkhof F, Black SE, Brooks DJ, Carrillo MC, Fox NC, Herholz K, Nordberg A, Jack CR Jr, Jagust WJ, Johnson KA, Rowe CC, Sperling RA, Thies W, Wahlund LO, Weiner MW, Pasqualetti P, Decarli C; ISTAART's NeuroImaging Professional Interest Area. Imaging markers for Alzheimer disease: which vs how. Neurology, 81(5):487-500. 2013 July 30. PMID: 23897875 PMC3776529 <http://www.ncbi.nlm.nih.gov/pubmed/23897875>

Curriculum Vitae - Michael W. Weiner, M.D.

663. Arbizu J, Prieto E, Martínez-Lage P, Martí-Climent JM, García-Granero M, Lamet I, Pastor P, Riverol M, Gómez-Isla MT, Peñuelas I., Richter JA, Weiner MW, Alzheimer's Disease Neuroimaging Initiative. Automated analysis of FDG PET as a tool for single-subject probabilistic prediction and detection of Alzheimer's disease dementia. European Journal of Nuclear Medicine and Molecular Imaging, 40(9): 1394-405. 2013 Sept. PMID: 23715905
<http://www.ncbi.nlm.nih.gov/pubmed/23715905>
664. Scanlon C, Mueller SG, Cheong I, Hartig M, Weiner MW, Laxer KD. Grey and white matter abnormalities in temporal lobe epilepsy with and without mesial temporal sclerosis. Journal of Neurology, 260(9):2320-9. 2013 Sep. PMID: 23754695 PMC3845492
<http://www.ncbi.nlm.nih.gov/pubmed/23754695>
665. Hibar D, Stein JL, Jahanshad N, Toga AW, McMahon KL, de Zubicaray GI, Montgomery GW, Martin NG, Wright MJ, Weiner MW, Thompson PM. Exhaustive search of the SNP-SNP interactome identifies replicated epistatic effects on brain volume in two cohorts. MICCAI 2013: Lecture Notes in Computer Science. 8151: 600-607. 2013. PMID: 24505811 PMC4109883
666. Madsen SK, Gutman BA, Joshi SH, Toga AW, Jack Jr. CR, Weiner MW, Thompson PM, for the Alzheimer's Disease Neuroimaging Initiative (ADNI). Mapping dynamic changes in ventricular volume onto baseline cortical surface maps in normal aging, MCI, and Alzheimer's disease. MICCAI MBIA 2013. 84-94. 2013. PMID: 25152934 PMC4138607
667. Daianu M, Dennis EL, Nir TM, Jahanshad N, Toga AW, Jack Jr. CR, Weiner MW, Thompson PM, and the Alzheimer's Disease Neuroimaging Initiative (ADNI). Disrupted Brain Connectivity in Alzheimer's Disease: Effects of Network Thresholding, MICCAI BC Workshop, Japan, 2013, submitted.
668. Jahanshad N, Kochunov P, Glahn D, Blangero J, Nichols TE, McMahon KL, de Zubicaray GI, Martin NG, Wright MJ, Nir T, Jack Jr. CR, Weiner MW, Toga AW, Thompson PM, the ADNI. Power Estimates for Voxel-Based Genetic Association Studies using Diffusion Imaging, submitted to MICCAI MBIA Workshop 2013, Nagoya, Japan, Sept. 22-26 2013 [12-page paper; peer-reviewed].
669. Jahanshad N, Bhatt P, Hibar DP, Villalon JE, Nir TM, Toga AW, Jack Jr. CR, Bernstein MA, Weiner MW, McMahon KL, de Zubicaray GI, Martin NG, Wright MJ, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative (ADNI). Bivariate genome-wide association study of genetically correlated neuroimaging phenotypes from DTI and MRI through a Seemingly Unrelated Regression model. MICCAI MBIA Workshop 2013: Lecture Notes in Computer Science. 8159:189-201. 2013
670. Shen L, Thompson PM, Potkin SG, Bertram L, Farrer LA, Foroud TM, Green RC, Hu X, Huentelman MJ, Kim S, Kauwe JSK, Li Q, Liu E, Macciardi F, Moore JH, Munsie L, Nho K, Ramanan VK, Risacher SL, Stone DJ, Swaminathan S, Toga AW, Weiner MW, Saykin AJ, and for the Alzheimer's Disease Neuroimaging Initiative. Genetic analysis of quantitative

Curriculum Vitae - Michael W. Weiner, M.D.

- phenotypes in AD and MCI: imaging, cognition and biomarkers. *Brain Imaging and Behavior*, 2013 Oct 5. PMID: 24092460 PMC3976843 <http://www.ncbi.nlm.nih.gov/pubmed/24092460>
671. Toledo JB, Cairns NJ, Da X, Chen K, Carter D, Fleisher A, Householder E, Ayutyanont N, Roontiva A, Bauer RJ, Eisen P, Shaw LM, Davatzikos C, Weiner MW, Reiman EM, Morris JC, Trojanowski JQ; Alzheimer's Disease Neuroimaging Initiative. Clinical and multimodal biomarker correlates of ADNI neuropathological findings. *Acta Neuropathologica Communications*, 1(1):65. 2013 Oct 9.
PMID: 24252435 PMC3893373 <http://www.ncbi.nlm.nih.gov/pubmed/24252435>
672. Kim HJ, Kim J, Cho H, Ye BS, Yoon CW, Noh Y, Kim GH, Lee JH, Kim JS, Choe YS, Lee KH, Kim CH, Seo SW, Weiner MW, Na DL, Seong JK. Individual subject classification of mixed dementia from pure subcortical vascular dementia based on subcortical shape analysis. *PLoS One*, 8(10): e75602. 2013 Oct 10.
PMID: 24130724 PMC3794958 <http://www.ncbi.nlm.nih.gov/pubmed/24130724>
673. Veitch DP, Friedl KE, Weiner MW. Military risk factors for cognitive decline, dementia and Alzheimer's disease. *Curr Alzheimer Res.*, 10(9):907-30. 2013 Nov.
PMID: 23906002 <http://www.ncbi.nlm.nih.gov/pubmed/23906002>
674. Ewers M1, Brendel M, Rizk-Jackson A, Rominger A, Bartenstein P, Schuff N, Weiner MW; Alzheimer's Disease Neuroimaging Initiative (ADNI). Reduced FDG-PET brain metabolism and executive function predict clinical progression in elderly healthy subjects. *NeuroImage Clinical*, 4(1):45-52. 2013 Nov 4. PMID: 24286024
<http://www.ncbi.nlm.nih.gov/pubmed/24286024>
675. Benzinger TL, Blazey T, Jack CR Jr, Koeppe RA, Su Y, Xiong C, Raichle ME, Snyder AZ, Ances BM, Bateman RJ, Cairns NJ, Fagan AM, Goate A, Marcus DS, Aisen PS, Christensen JJ, Ercole L, Hornbeck RC, Farrar AM, Aldea P, Jasielec MS, Owen CJ, Xie X, Mayeux R, Brickman A, McDade E, Klunk W, Mathis CA, Ringman J, Thompson PM, Ghetti B, Saykin AJ, Sperling RA, Johnson KA, Salloway S, Correia S, Schofield PR, Masters CL, Rowe C, Villemagne VL, Martins R, Ourselin S, Rossor MN, Fox NC, Cash DM, Weiner MW, Holtzman DM, Buckles VD, Moulder K, Morris JC. Regional variability of imaging biomarkers in autosomal dominant Alzheimer's disease. *Proc Natl Acad Sci U S A*, 110(47): E4502-9. 2013 Nov 19. PMC3839740 <http://www.ncbi.nlm.nih.gov/pubmed/24194552>
676. Liu X, Tosun D, Weiner MW, Schuff N; Alzheimer's Disease Neuroimaging Initiative. Locally linear embedding (LLE) for MRI based Alzheimer's disease classification. *NeuroImage*, 83:148-57. 2013 Dec. PMID: 23792982 PMC3815961
<http://www.ncbi.nlm.nih.gov/pubmed/23792982>
677. Toledo JB, Da X, Weiner MW, Wolk DA, Xie SX, Arnold SE, Davatzikos C, Shaw LM, Trojanowski JQ, and for the Alzheimer's Disease Neuroimaging Initiative. CSF Apo-E levels

Curriculum Vitae - Michael W. Weiner, M.D.

associate with cognitive decline and MRI changes. *Acta Neuropathologica*, Accepted 2013 Dec 17. PMID: 24385135 PMC3988233 <http://www.ncbi.nlm.nih.gov/pubmed/24385135>

678. Kim HJ, Ye BS, Yoon CW, Cho H, Noh Y, Kim GH, Choi YS, Kim JH, Jeon S, Lee JM, Kim JS, Choe YS, Lee KH, Kim ST, Kim C, Kang DR, Ki CS, Lee JH, Werring DJ, Weiner MW, Na DL, Seo SW. Effects of APOE ε4 on brain amyloid, lacunar infarcts, and white matter lesions: a study among patients with subcortical vascular cognitive impairment. *Neurobiology of Aging*, 34(11):2482-7. 2013 Nov. PMID: 23769398
<http://www.ncbi.nlm.nih.gov/pubmed/23769398>
679. Roussotte FF, Gutman BA, Hibar DP, Jahanshad N, Madsen SK, Jack CR Jr, Weiner MW, Thompson PM; Alzheimer's Disease Neuroimaging Initiative (ADNI). A single nucleotide polymorphism associated with reduced alcohol intake in the RASGRF2 gene predicts larger cortical volumes but faster longitudinal ventricular expansion in the elderly. *Frontiers in Aging Neuroscience*, 5:93. 2013 Dec 19. PMID: 24409144 PMC3867747
<http://www.ncbi.nlm.nih.gov/pubmed/24409144>
680. Snyder HM, Carrillo M, Grodstein F, Henriksen K, Jeromin A, Lovestone S, Mielke MM, O'Bryant S, Sarasa M, Sjøgren M, Soares H, Teeling J, Trushina E, Ward M, West T, Bain LJ, Shineman DW, Weiner MW, Fillit H. Developing Novel Blood-Based Biomarkers for Alzheimer's Disease. *Alzheimer's & Dementia*. 10(1):109-14. 2014 Jan.
PMID: 24365657 <http://www.ncbi.nlm.nih.gov/pubmed/24365657>
681. Park JH, Seo SW, Kim C, Kim SH, Kim GH, Kim ST, Jeon S, Lee JM, Oh SJ, Kim JS, Choe YS, Lee KH, Shin JS, Kim CH, Noh Y, Cho H, Yoon CW, Kim HJ, Ye BS, Ewers M, Weiner MW, Lee JH, Werring DJ, Na DL. Effects of cerebrovascular disease and amyloid beta burden on cognition in subjects with subcortical vascular cognitive impairment. *Neurobiology of Aging*, 35(1):254-60. 2014 Jan. PMID: 23932881
<http://www.ncbi.nlm.nih.gov/pubmed/23932881>
682. Henriksen K, O'Bryant SE, Hampel H, Trojanowski JQ, Montine TJ, Jeromin A, Blennow K, Lönneborg A, Wyss-Coray T, Soares H, Bazenet C, Sjögren M, Hu W, Lovestone S11, Karsdal MA13, Weiner MW14; Blood-Based Biomarker Interest Group. *Alzheimers & Dementia*, 10(1):115-31. 2014 Jan. PMID: 23850333 PMC4128378
<http://www.ncbi.nlm.nih.gov/pubmed/23850333>
683. Apostolova LG, Hwang KS, Kohannim O, Avila D1, Elashoff D, Jack CR Jr, Shaw L, Trojanowski JQ, Weiner MW, Thompson PM; Alzheimer's Disease Neuroimaging Initiative. ApoE4 effects on automated diagnostic classifiers for mild cognitive impairment and Alzheimer's disease. *NeuroImage Clinical*, 4(1):461-72. 2014 Jan 4. PMID: 24634832 PMC3952354 <http://www.ncbi.nlm.nih.gov/pubmed/24634832>
684. Thompson PM, Stein JL, Medland SE, Hibar DP, et al. The ENIGMA Consortium: large-scale collaborative analyses of neuroimaging and genetic data. *Brain Imaging Behav*. 2014 Jan 8.

Curriculum Vitae - Michael W. Weiner, M.D.

[Epub ahead of print]. PMID: 24399358 PMC4008818
<http://www.ncbi.nlm.nih.gov/pubmed/24399358>

685. Villeneuve S, Reed BR, Wirth M, Haase CM, Madison CM, Ayakta N, Mack W, Mungas D, Chui HC, Decarli C, Weiner MW, Jagust WJ. Cortical thickness mediates the effect of β -amyloid on episodic memory. *Neurology*, [Epub ahead of print] 2014 Jan 31. PMID: 24489134 PMCID: PMC3945649 <http://www.ncbi.nlm.nih.gov/pubmed/24489134>
686. Lee J-Y, Park S, Mackin S, Ewers M, Chui H, Jagust W, Insel PS, Weiner MW. Differences in Prefrontal, Limbic, and White Matter Lesion Volumes According to Cognitive Status in Elderly Patients with First-Onset Subsyndromal Depression. *PLoS ONE*, 9(1): e87747. 2014 Jan 31. PMID: 24498184 PMCID: PMC3909227
687. Lee MJ, Seo SW, Na DL, Kim C, Park JH, Kim GH, Kim CH, Noh Y, Cho H, Kim HJ, Yoon CW, Ye BS, Chin J, Jeon S, Lee JM, Choe YS, Lee KH, Kim JS, Kim ST, Lee JH, Ewers M, Werring DJ, Weiner MW. Synergistic Effects of Ischemia and β -Amyloid Burden on Cognitive Decline in Patients With Subcortical Vascular Mild Cognitive Impairment. *JAMA Psychiatry*, 2014 Feb 19 [Epub ahead of print]. PMID: 24554306 <http://www.ncbi.nlm.nih.gov/pubmed/24554306>
688. Noh Y, Seo SW, Jeon S, Lee JM, Kim JH, Kim GH, Cho H, Yoon CW, Kim HJ, Ye BS, Kim ST, Choe YS, Lee KH, Kim JS, Ewers M, Weiner MW, Lee JH, Werring DJ, Kang DR, Kim CS, Na DL. White Matter Hyperintensities are associated with Amyloid Burden in APOE4 Non-Carriers. *Journal of Alzheimers Disease*, 2014 Feb 20 [Epub ahead of print]. PMID: 24577457 <http://www.ncbi.nlm.nih.gov/pubmed/24577457>
689. Chao LL, Mohlenhoff BS, Weiner MW, Neylan TC. Associations between Subjective Sleep Quality and Brain Volume in Gulf War Veterans. *Sleep*, 37(3):445-52. 2014 Mar 1. PMID: 24587566 PMCID: PMC3920309 <http://www.ncbi.nlm.nih.gov/pubmed/24587566>
690. Toledo JB, Weiner MW, Wolk DA, Da X, Chen K, Arnold SE, Jagust W, Jack C, Reiman EM, Davatzikos C, Shaw LM, Trojanowski JQ. Neuronal injury biomarkers and prognosis in ADNI subjects with normal cognition. *Acta Neuropathol Commun*, 2(1):26. 2014 Mar 6. PMID: 24602322 PMCID: PMC4008258 <http://www.ncbi.nlm.nih.gov/pubmed/24602322>
691. Mackin RS1, Insel P, Truran D, Vichinsky EP, Neumayr LD, Armstrong FD, Gold JI, Kesler K, Brewer J, Weiner MW; Neuropsychological Dysfunction and Neuroimaging Adult Sickle Cell Anemia Study Group. Neuroimaging abnormalities in adults with sickle cell anemia: Associations with cognition. *Neurology*, 82(10):835-41. 2014 Mar 11. PMID: 24523480 PMCID: PMC3959758 <http://www.ncbi.nlm.nih.gov/pubmed/24523480>
692. Mattsson N, Tosun D, Insel PS, Simonson A, Jack CR Jr, Beckett LA, Donohue M, Jagust W, Schuff N, Weiner MW; on behalf of the Alzheimer's Disease Neuroimaging Initiative. Association of brain amyloid- β with cerebral perfusion and structure in Alzheimer's disease and mild cognitive impairment. *BRAIN: a journal of neurology*, 2014 Mar 12 [Epub ahead of

Curriculum Vitae - Michael W. Weiner, M.D.

print]. PMID: 24625697 PMCID: PMC3999717
<http://www.ncbi.nlm.nih.gov/pubmed/24625697>

693. Mattsson N, Insel P, Nosheny R, Tosun D, Trojanowski JQ, Shaw LM, Clifford JR Jr, Donohue M, Weiner M; for the Alzheimer's Disease Neuroimaging Initiative. Emerging β-amyloid pathology and accelerated cortical atrophy. *JAMA Neurology*. 2014 *In Press*. PMID: 24781145
694. Durazzo, T.C., Mattsson, N., Weiner, M.W., Korecka, M., Trojanowski, J.Q., Shaw, L.M.; Alzheimer's Disease Neuroimaging Initiative. [History of cigarette smoking in cognitively-normal elders is associated with elevated cerebrospinal fluid biomarkers of oxidative stress](#). *Drug Alcohol Depend*, 142:262-8, 2014 Sep 1. PMID: 25037769 PMCID: PMC4144023
695. Tsao, S., Gajawelli, N., Hwang, D.H., Kriger, S., Law, M., Chui, H., Weiner, M., Lepore, N. [Mapping of ApoE4 Related White Matter Damage using Diffusion MRI](#) *Proc. Soc. Photo Opt Instrum Eng.*, 9039:90390H, 2014 Apr 9. PMID: 25076830 PMCID: PMC4112767
696. Weiner, M.W. [Military Risk Supplement. Preface](#). *Alzheimers Dement*. 10(3 Suppl):S92-3, 2014. PMID:24924678
697. Weiner, M.W., Veitch, D.P., Hayes, J., Neylan, T., Grafman, J., Aisen, P.S., Petersen, R.C., Jack, C., Jagust, W., Trojanowski, J.Q., Shaw, L.M., Saykin, A.J., Green, R.C., Harvey, D., Toga, A.W., Friedl, K.E., Pacifico, A., Sheline, Y., Yaffe, K., Mohlenhoff, B.; Department of Defense Alzheimer's Disease Neuroimaging Initiative. [Effects of traumatic brain injury and posttraumatic stress disorder on Alzheimer's disease in veterans, using the Alzheimer's Disease Neuroimaging Initiative](#). *Alzheimers Dement*. 10(3 Suppl):S226-35, 2014. PMID: 24924673
698. Mohlenhoff, B.S., Chao, L.L., Buckley, S.T., Weiner, M.W., Neylan, T.C. [Are hippocampal size differences in posttraumatic stress disorder mediated by sleep pathology?](#) *Alzheimers Dement*, 10(3 Suppl):S146-54, 2014. PMID: 24924666 PMCID: PMC4111235
699. Durazzo, T.C., Mattsson, N., Weiner, M.W., the Alzheimer's Disease Neuroimaging Initiative. [Smoking and increased Alzheimer's disease risk: a review of potential mechanisms](#). *Alzheimers Dement*, 10(3 Suppl):S122-45, 2014 Jun 10. PMID: 24924665 PMCID: PMC4098701
700. Villeneuve, S., Reed, B.R., Madison, C.M., Wirth, M., Marchant, N.L., Kriger, S., Mack, W.J., Sanossian, N., DeCarli, C., Chui, H.C., Weiner, M.W., Jagust, W.J. [Vascular risk and Aβ interact to reduce cortical thickness in AD vulnerable brain regions](#). *Neurology*, 83(1):40-7, 2014 Jul 1. PMID: 24907234 PMCID: PMC4114172
701. Weiner, M., Tröndle, J., Albermann, C., Sprenger, G.A., Weuster-Botz, D. [Improvement of constraint-based flux estimation during L-phenylalanine production with Escherichia coli using targeted knock-out mutants](#). *Biotechnol Bioeng*, 111(7):1406-16, 2014. PMID: 24449451
702. Sudheimer, K.D., O'Hara, R., Spiegel, D., Powers, B., Kraemer, H.C., Neri, E., Weiner, M., Hardan, A., Hallmayer, J., Dhabhar, F.S. [Cortisol, cytokines, and hippocampal volume interactions in the elderly](#). *Front Aging Neurosci*, 6:153, 2014. PMID: 25071562 PMCID: PMC4079951

Curriculum Vitae - Michael W. Weiner, M.D.

703. Maier-Hein, K.H., Westin, C.F., Shenton, M.E., Weiner, M.W., Raj, A., Thomann, P., Kikinis, R., Stieljes, B., Pasternak, O. [Widespread white matter degeneration preceding the onset of dementia](#). Alzheimers Dement, pii: S1552-5260(14)00648-7, 2014. PMID: 25035154
704. Ye, B.S., Seo, S.W., Kim, G.H., Noh, Y., Cho, H., Yoon, C.W., Kim, H.J., Chin, J., Jeon, S., Lee, J.M., Seong, J.K., Kim, J.S., Lee, J.H., Choe, Y.S., Lee, K.H., Sohn, Y.H., Ewers, M., Weiner, M., Na, D.L. [Amyloid burden, cerebrovascular disease, brain atrophy, and cognition in cognitively impaired patients](#). Alzheimers Dement, pii: S1552-5260(14)02419-4, 2014. PMID: 25048578
705. Thomas, J.B., Brier, M.R., Bateman, R.J., Snyder, A.Z., Benzinger, T.L., Xiong, C., Raichle, M., Holtzman, D.M., Sperling, R.A., Mayeux, R., Ghetti, B., Ringman, J.M., Salloway, S., McDade, E., Rossor, M.N., Ourselin, S., Schofield, P.R., Masters, C.L., Martins, R.N., Weiner, M.W., Thompson, P.M., Fox, N.C., Koeppe, R.A., Jack, C.R. Jr., Mathis, C.A., Oliver, A., Blazey, T.M., Moulder, K., Buckles, V., Hornbeck, R., Chhatwal, J., Schultz, A.P., Goate, A.M., Fagan, A.M., Cairns, N.J., Marcus, D.S., Morris, J.C., Ances, B.M. [Functional connectivity in autosomal dominant and late-onset Alzheimer disease](#). JAMA Neurol, 71(9):1111-22, 2014 Sep 1. PMID: 25069482
706. Donohue, M.C., Sperling, R.A., Salmon, D.P., Rentz, D.M., Raman, R., Thomas, R.G., Weiner, M., Aisen, P.S.; Australian Imaging, Biomarkers, and Lifestyle Flagship Study of Ageing; Alzheimer's Disease Neuroimaging Initiative; Alzheimer's Disease Cooperative Study. [The preclinical Alzheimer cognitive composite: measuring amyloid-related decline](#). JAMA Neurol., 71(8):961-70, 2014. PMID: 24886908
707. Mackin, R.S., Insel, P., Zhang, J., Mohlenhoff, B., Galasko, D., Weiner, M., Mattsson, N. [Cerebrospinal Fluid \$\alpha\$ -Synuclein and Lewy Body-Like Symptoms in Normal Controls, Mild Cognitive Impairment, and Alzheimer's Disease](#). J Alzheimers Dis., [Epub ahead of print], 2014. PMID: 25125463
708. Gutman, B.A., Wang, Y., Yanovsky, I., Hua, X., Toga, A.W., Jack, C.R. Jr., Weiner, M.W., Thompson, P.M.; for the Alzheimer's Disease Neuroimaging Initiative. [Empowering imaging biomarkers of Alzheimer's disease](#). Neurobiol Aging, pii: S0197-4580(14)00544-2, 2014. PMID: 25260848
709. O'Bryant, S.E., Gupta, V., Henriksen, K., Edwards, M., Jeromin, A., Lista, S., Bazenet, C., Soares, H., Lovestone, S., Hampel, H., Montine, T., Blennow, K., Foroud, T., Carrillo, M., Graff-Radford, N., Laske, C., Breteler, M., Shaw, L., Trojanowski, J.Q., Schupf, N., Rissman, R.A., Fagan, A.M., Oberoi, P., Umek, R., Weiner, M.W., Grammas, P., Posner, H., Martins, R.; STAR-B and BBBIG working groups. [Guidelines for the standardization of preanalytic variables for blood-based biomarker studies in Alzheimer's disease research](#). Alzheimers Dement, pii: S1552-5260(14)02765-4, 2014.
710. Lee SE, Khazenzon AM, Trujillo AJ, Guo CC, Yokoyama JS, Sha SJ, Takada LT, Karydas AM, Block NR, Coppola G, Pribadi M, Geschwind DH, Rademakers R, Fong JC, Weiner MW, Boxer AL, Kramer JH, Rosen HJ, Miller BL, Seeley WW. [Altered network connectivity in frontotemporal dementia with C9orf72 hexanucleotide repeat expansion](#). Brain, pii: awu248, 2014. PMID: 25273996
711. Albermann, C., Weiner, M., Tröndle, J., Weuster-Botz, D., Sprenger, GA. [Utilization of organophosphate:phosphate antiporter for isotope-labeling experiments in E. coli](#). FEMS Microbiol Lett, doi: 10.1111/1574-6968, 2014. PMID: 25273627

Curriculum Vitae - Michael W. Weiner, M.D.

712. Nosheny, R.L., Insel, P.S., Truran, D., Schuff, N., Jack, C.R. Jr., Aisen, P.S., Shaw, L.M., Trojanowski, J.Q., Weiner, M.W.; Alzheimer's Disease Neuroimaging Initiative. [Variables associated with hippocampal atrophy rate in normal aging and mild cognitive impairment.](#) Neurobiol Aging, pii: S0197-4580(14)00505-3, 2014.
713. Russ, A.L., Zillich, A.J., Melton, B.L., Russell, S.A., Chen, S., Spina, J.R., Weiner, M., Johnson, E.G., Daggy, J.K., McManus, M.S., Hawsey, J.M., Puleo, A.G., Doebling, B.N., Saleem, J.J. [Applying human factors principles to alert design increases efficiency and reduces prescribing errors in a scenario-based simulation.](#) J Am Med Inform Assoc., 21(e2):e287-96, 2014. PMID: 24668841 PMCID: PMC4173163
714. Warstadt, N.M., Dennis, E.L., Jahanshad, N., Kohannim, O., Nir, T.M., McMahon, K.L., de Zubiray, G.I., Montgomery, G.W., Henders, A.K., Martin, N.G., Whitfield, J.B., Jack, C.R. Jr., Bernstein, M.A., Weiner, M.W., Toga, A.W., Wright, M.J., Thompson, P.M.; Alzheimer's Disease Neuroimaging Initiative (ADNI). [Serum cholesterol and variant in cholesterol-related gene CETP predict white matter microstructure.](#) Neurobiol Aging, 35(11):2504-13, 2014. PMID: 24997672
715. Taylor, J.L., Scanlon, B.K., Farrell, M., Hernandez, B., Adamson, M.M., Ashford, J.W., Noda, A., Murphy, G.M. Jr., Weiner, M.W. [APOE-epsilon4 and aging of medial temporal lobe gray matter in healthy adults older than 50 years.](#) Neurobiol Aging, 35(11):2479-85, 2014. PMID: 24929969 PMCID: PMC4171437
716. Nho, K., Li, Huian, L., Bharthur, A., Weiner, M.W., Toga, A.W., West, J.D., Henschel, R., Tavares, M.C., Green, R.C., Saykin, A.J. for the Alzheimer's Disease Neuroimaging Initiative (ADNI). Comparison of Multi-Sample Variant Calling Methods for Whole Genome Sequencing. *In press.*
717. Ramanan, V.K., Nho, K., Shen, L., Risacher, S.L., Kim, S., McDonald, B.C., Farlow, M.R., Foroud, T.M., Gao, S., Soininen, H., Kloszewska, I., Mecocci, P., Tsolaki, M., Vellas, B., Lovestone, S., Aisen, P.S., Petersen, R.C., Jack Jr., C.R., Shaw, L.M., Trojanowski, J.Q., Weiner, M.W., Green, R.C., Toga, A.W., De Jager, P.L., Yu, L., Bennett, D.A., Saykin, A.J. and for the Alzheimer's Disease Neuroimaging Initiative (ADNI). [FASTKD2 is associated with memory and hippocampal structure in older adults.](#) Molecular Psychiatry, 2014. PMID: 25385369
718. Madsen, S.K., Gutman, B.A., Joshi, S.H., Toga, A.W., Jack, C.R. Jr, Weiner, M.W., Thompson, P.M.; Alzheimer's Disease Neuroimaging Initiative (ADNI). [Mapping ventricular expansion onto cortical gray matter in older adults.](#) Neurobiol Aging, 2014. PMID: 25311280
- 719.

ABSTRACTS:

1. Weiner, M.W., Hayslett, J.P., Kashgarian, M. and Epstein, F.H.: Accelerated reabsorption in the proximal tubule produced by sodium depletion. Abstracts of IVth International Congress of Nephrology, p.233, 1969. (Presented by M. Weiner at IVth International Congress of Nephrology).

Curriculum Vitae - Michael W. Weiner, M.D.

2. Weinman, E.J., Hayslett, J.P., Weiner, M.W., Kashgarian, M. and Epstein, F.H.: Independent effects of salt depletion and oncotic pressure in the proximal tubule. *J. Clin. Invest.* 49:101a, 1970. (Presented at the 1970 Annual Meeting of the American Federation Clinical Research).
3. Weiner, M.W., Torretti, J., Sauer, L.A. and Epstein, F.H.: Function of renal mitochondria in potassium deficiency. *Clinical Research* 18: 520, 1970.
4. Weiner, M.W.: Cation transport by kidney mitochondria. Abstracts of the 5th Annual Meeting of the American Society of Nephrology, p.89, 1971.
5. Weiner, M.W.: Sodium stimulated ATPase activity of kidney mitochondria. *J. Lab. Clin. Med.* 78:1021, 1971.
6. Weiner, M.W.: ADP induced reduction of pyridine nucleotides in kidney mitochondria. *Federation Proceedings* 31:920, 1972.
7. Weiner, M.W.: Energy dependent sodium transport by kidney mitochondria. Abstracts of Vth International Congress of Nephrology, p.148, 1972. Presented at the Congress.
8. Manuel, A.R., Beirne, G.J., Wagnild, J.P. and Weiner, M.W.: An effect of spironolactone on urinary acidification in normal man. *Clin. Res.* 20: 764, 1972.
9. Diamond, A.J. and Weiner, M.W.: A quantitative study of renal hydrogen ion secretion and excretion during acute acid loading. *Clin. Res.* 21: 684, 1973.
10. Weiner, M.W. and Cunarro, J.A.: Quantitative correlation between the proton-carrying and respiratory-stimulating properties of uncoupling agents using rat liver mitochondria. *Federation Proceedings* 32:669, 1973. (Presented at Federation Meetings in Atlantic City, N.J. 1973) and Abstracts of Ninth International Congress of Biochemistry, Stockholm, Sweden, July 1973, p.245. (Presented at Congress).
11. Flygt, T.R. and Weiner, M.W.: Effects of volume-depletion on ATPase, nucleic acids, and compensatory growth of the rat kidney. Abstracts of the 6th Annual Meeting of the American Society of Nephrology, p.36, 1973.
12. Weiner, M.W.: Effects of chloride on renal Na-K ATPase. *Clin. Res.* 21:896, 1973.
13. Manuel, M.A., Cunarro, J.A., and Weiner, M.W.: Action of ethacrynic acid and furosemide on isolated tubules and mitochondria. *Clinical Research* 22:537A, 1974.
14. Manuel, M.A. and Weiner, M.W.: Action of ethacrynic acid and furosemide on rat kidney mitochondria. *Fed. Proc.* 33:1292, 1974. Presented at Meeting of American Soc. Biol. Chem., Minneapolis, Minn. June 1974.

Curriculum Vitae - Michael W. Weiner, M.D.

15. Manuel, M.A., Cunarro, J.A., and Weiner, M.W.: Cellular actions of ethacrynic acid and furosemide. VII World Congress of Cardiology, Buenos Aires, Argentina, Sept. 1974.
16. Weiner, M.W., Cunarro, J.A., and Manuel, M.A.: Biochemical mechanisms of ethacrynic acid and furosemide. Proceedings of the International Union of Physiological Sciences. XI: III, 1974.
17. Cunarro, J.A., Manuel, M.A., and Weiner, M.W.: Biochemical actions of diuretics *in vivo* and *in vitro*. Circulation 50:136, 1974. American Heart Association, Dallas, Texas, Nov. 1974.
18. Cunarro, J.A., Manuel, M.A., and Weiner, M.W.: Effects of furosemide on kidney metabolism. Abstracts of the 7th Annual Meeting of the American Society of Nephrology, p.20. Kidney International 6:34A, 1974.
19. Cunarro, J.A., Johnson, W.A., Uehling, D.T., Updike, S.J., and Weiner, M.W.: Effects of low temperature preservation on metabolite levels of dog renal cortex. Presented at the Kidney Foundation Clinical Dialysis & Transplantation Forum IV:196, 1974 and the Western Dialysis and Transplant Society meetings, San Francisco, 1974.
20. Cunarro, J.A., Manuel, M.A., and Weiner, M.W.: Mechanism of action of furosemide *in vivo* and on isolated renal tubules and mitochondria. Clin. Res. 13:102A, 1975. Presented at the meeting of Western Section of A.F.C.R., Carmel, California, February 1975.
21. Weiner, M.W., Johnson, W.A., Uehling, D.T., and Updike, S.J.: Metabolic consequences of low temperature kidney preservation. Abstracts, International Congress of Nephrology #1020, June 1977.
22. Weiner, M.W., Cunarro, J.A., and Manuel, M.A.: Biochemical mechanism of furosemide. Abstracts VIth International Congress of Nephrology #244, June 1977.
23. Wingert, K.J. and Weiner, M.W.: Acetate dialysance by the Dow-4 hollow fiber artificial kidney. Presented at the Clinical Dialysis and Transplant Forum, 5:15, 1975.
24. Weiner, M.W.: Mechanism of chloride transport by toad bladder. Abstracts of the 8th Annual Meeting of the American Society of Nephrology. Washington D.C., November 1975, p.96.
25. Weiner, M.W.: Relationship between chloride, bicarbonate and hydroxyl transport in toad bladder. Clinical Research 24:416A, 1976. Presented at the meeting of the Western Section of A.F.C.R., Carmel, CA, 1976.
26. Weiner, M.W.: Chloride transport by toad bladder: Exchange with bicarbonate or hydroxyl ion. Federation Proceedings 35:465, 1976. Presented at the FASEB meeting, Anaheim, California, 1976.

Curriculum Vitae - Michael W. Weiner, M.D.

27. Weiner, M.W.: The role of acetate in dialysate for hemodialysis: An investigation using biochemical and radiorespirometric techniques. Proceedings of the 9th Annual Contractors Conference, p.21, 1976. Presented at the 9th Annual Contractors' Conference.
28. Wingert, K.J. and Weiner, M.W.: Dialysance of acetate by two types of artificial kidneys. Clinical Research 24:150A, February 1976.
29. Wingert, K.J. and Weiner, M.W.: Acetate dialysance by parallel flow, coil and hollow fiber artificial kidneys. ASALO 22nd Annual Meeting 5:86, 1976.
30. Weiner, M.W.: Effects of ethacrynic acid and furosemide on phosphorylation reactions of kidney mitochondria: Inhibition of the adenine nucleotide translocase. Federation Proceedings 35:1558, 1976. Presented at the meeting of the American Society of Biological Chemists, San Francisco, CA. June 1976.
31. Wingert, K.J. and Weiner, M.W.: Acetate transfer by artificial kidneys *in vitro*. Abstracts of the Western Dialysis and Transplant Society, p.13, 1976. Presented at the 7th Annual Meeting of the Western Dialysis and Transplant Society. Seattle, Washington, October 1976.
32. Richards, R.J., Dowling, J.A., Vreman, H.J., Feldman, C.A., and Weiner, M.W.: Acetate levels in human plasma. Abstracts of the Clinical Dialysis and Transplant Forum, p.16, 1976. Presented in Washington, D.C., November 1976.
33. Weiner, M.W., Vreman, H.J., Richards, R.J., and Feldman, C.A.: The role of acetate in dialysate for hemodialysis. Proceedings of the Tenth Annual Contractors Conference, pp.20-21, 1977. Presented at the Annual Contractors' Conference in Washington D.C., January 1977.
34. Richards, R.J., Feldman, C.A., Vreman, H.J., and Weiner, M.W.: Acetate metabolism in normal subjects and dialysis patients. Clinical Research 25:446A, 1977.
35. McTigue, M., Ting, G.O., and Weiner, M.W.: The relationship between sodium transport and oxygen consumption in the perfused rat kidney. Clinical Research 25:442A, 1977.
36. Winder, C., and Weiner, M.W.: The use of uncoupling agents to distinguish between inhibition of transport or inhibition of metabolism in toad bladders. Clinical Research 25:451A, 1977.
37. Feldman, C.A., Vreman, H.J., and Weiner, M.W.: Acetate metabolism in hemodialysis patients. Abstracts of the 8th Annual Meeting of the Western Dialysis and Transplant Society, p.4. Presented, Los Angeles, September 1977.
38. Weiner, M.W.: Effects of inhibitors, uncouplers, and diuretics on transport and metabolism of toad bladders. Abstracts of the 10th Annual Meeting of the American Society of Nephrology p. 93A. Presented Washington, D.C., November 1977.

Curriculum Vitae - Michael W. Weiner, M.D.

39. Ting, G.O., McTigue, M., and Weiner, M.W.: Effects of bicarbonate reabsorption on the Na/0₂, of the perfused rat kidney. Abstracts of the IOth Annual Meeting of the American Society of Nephrology, p.123A, 1977, Clinical Research 26:141A, 1978; Abstracts of the VIIth International Congress of Nephrology # A10, June 1978.
40. Feldman, C.A., Vreman, H.J., and Weiner, M.W.: Mass balance of acetate and bicarbonate during hemodialysis. Abstracts of the Clinical Dialysis and Transplant Forum, p.14, 1977. Presented at the 7th Annual Meeting of the Clinical Dialysis and Transplant Forum. Washington, D.C., November 1977.
41. Weiner, M.W.: Mechanism of diuretics on toad bladders. Clinical Research 36:142A, 1978. Presented at the Western Section of Clinical Research, Carmel, CA. February 1978.
42. Feldman, C.A., Vreman, H.J., and Weiner, M.W.: Normal and impaired acetate metabolism in hemodialysis subjects. Clinical Research 26:139A, 1978.
43. Urion, D., McClendon, F., and Weiner, M.W.: Acetate: A possible fuel for the brain. Clinical Research 26: 132A, 1978.
44. Weiner, M.W.: The role of acetate in dialysate for hemodialysis: Acid-base homeostasis and acetate metabolism in patients treated by chronic hemodialysis. Proceedings of the 11th Annual Contractor's Conference, p.79-80, 1978. Presented at the 11th Annual Contractor's Conference, Washington D.C., January 1978.
45. Feldman, C.A., Vreman, H.J. and Weiner, M.W.: The role of acetate in the correction of acidosis during hemodialysis. Abstracts of the VIIth International Congress of Nephrology #S-22, June 1978. Presented at the VIIth International Congress of Nephrology, June 1978. Clin. Res. 26:4621A, 1978.
46. Cunarro, J.A. and Weiner, M.W.: Effects of ethacrynic acid and furosemide on respiration of isolated kidney tubules: The role of chloride transport and the source of metabolic energy. Abstracts of the VIIth International Congress of Nephrology #A-11, June 1978. Presented at the VIIth International Congress of Nephrology, June 1978.
47. Weiner, M.W.: Effects of diuretics and potassium on energy metabolism of toad bladders. Abstracts of the VIIth International Congress of Nephrology #A-10, June 1978. Presented at the VIIth International Congress of Nephrology, June 1978. Clin. Res. 26:478A, 1978.
48. Kaiser, B.A., Potter, D.E., Bryant, E.R., Vreman, H.J. and Weiner, M.W.: Acid base homeostasis and acetate metabolism in children on hemodialysis. Abstracts of the Western Dialysis and Transplant Society, p.10, 1978. Presented October 1978.
49. Vreman H.J. and Weiner, M.W. Taste, smell, and zinc metabolism in uremia. Abst. Western Dial. Transplant Society, p.20, 1978.

Curriculum Vitae - Michael W. Weiner, M.D.

50. Assomull V., Vreman, H.J., and Weiner, M.W. Mass balance of base equivalents during hemodialysis: Importance of organic acid anions. Abstracts of the 8th Annual Clinical Dialysis and Transplant Forum p.137-141, 1978. Presented at the 8th Annual Meeting of the Clinical Dialysis and Transplant Forum, November 1978.
51. Levi, J., Jacobs, C., McTigue, M., and Weiner, M.W. Effects of Cis-diamminedichloroplatinum (Cis-Pt) on renal SH groups. Abstracts of 11th Annual Meeting of the American Society of Nephrology. p. 94A, 1978.
52. Kaiser, B.A., Potter, D.E., Bryant, R.E., Vreman H.J. and Weiner, M.W. Acid base homeostasis and acetate (Ac) metabolism in children on hemodialysis (HD). Abstracts of 11th Annual Meeting of the American Society of Nephrology, p. 43A, 1978. Clinical Research 27:132A, 1979.
53. Spires, D.A., and Weiner, M.W. Use of an uncoupling agent to investigate the mechanism by which ADH stimulates metabolism and transport. Abstracts of the 11th Annual Meeting of the American Society of Nephrology. p. III-A, 1978.
54. Spires D.A., and Weiner, M.W.: Use of uncoupling agents to distinguish between direct effects on transport and direct effects on metabolism. The Physiologist 21:114, 1978. Presented at the American Physiologist Society Meeting, St. Louis, MO, October 1978. Clinical Research 27:423A, 1979. Federation Proceedings 38:1145, 1979. Presented at the 63rd Annual FASEB Meeting, Dallas, Texas, April 1979.
55. Jalan, J., Weil, N., Michaels, A.S., and Weiner, M.W.: Formulation of a stable single 25:1 concentrate of bicarbonate-containing dialysate. Abstracts of the 11th Annual Meeting of the American Society of Nephrology, p.43A. Presented at meeting November 1978. Abstracts of the 2nd Annual Meeting of the International Society for Artificial Organs 3:19, 1979. Presented at meeting April 1979. Clinical Research 27:92A, 1979.
56. Weiner, M.W., Vreman H.J., Assomull V.M., and Kaiser, B.A.: Acid-base homeostasis in hemodialysis. Proceedings of the 12th Annual Contractor's Conference, p.104, 1979. Presented at the 12th annual Contractor's Conference, Bethesda, Maryland.
57. Kaiser, B.A., Assomull, V.M., Vreman, H.J., and Weiner, M.W.: Dialysance of Acetate and bicarbonate: Effect of ultrafiltration. Abstracts of the 9th Annual Meeting of the Clinical Dialysis and Transplant Forum. p. 39, November 1979. Presented at 9th Annual Meeting.
58. Assomull, V.M., Vreman, H.J., and Weiner, M.W.: Evidence that acetate in dialysate does not stimulate lipid synthesis. Abstracts of the 9th Annual Meeting of the Clinical Dialysis and Transplant Forum. p. 28, November 1979. Presented at the 9th Annual Meeting of the Clinical Dialysis and Transplant Forum, November 1979.

Curriculum Vitae - Michael W. Weiner, M.D.

59. Weiner, M.W.: Metabolic effects of aldosterone on toad bladders. Abstracts of the American Society of Nephrology. p. 72A, 1979.
60. Jacobs, C., Kelly, G., Kalman, S., and Weiner, M.W.: Renal handling of Cisdiamminedichloroplatinum. Abstracts of the American Society of Nephrology. p. 109A, 1979. Presented at the 12th Annual Meeting of the American Society of Nephrology. November 1979.
61. Dobyan, D.C., Levi, J., Kosek, L., Jacobs, C. and Weiner, M.W.: Pathologic effects of cis-diamminedichloroplatinum. Abstracts of the American Society of Nephrology. p.2A, 1979.
62. Weiner, M.W.: Metabolic effects of aldosterone on toad bladders. Clinical Research 28:65A, 1979. Presented at the Western Section AFCR, Carmel, CA. 1980.
63. Jacobs, C., Kelly, G., Kalman, S., and Weiner, M.W.: Renal handling of cis-diamminedichloroplatinum. Clinical Research 28:62A, 1979. Presented at the Western Section AFCR, Carmel, CA. February 1980.
64. Weiner, M.W.: Metabolic effects of aldosterone on toad bladders. Presented at the National Meeting of the American Federation for Clinical Research. Washington, D.C., May 1980. Clinical Research: 28:465A, 1980.
65. Kaiser, B.A., Vreman, H.J. and Weiner, M.W.: Effects of cisplatin, mercuric chloride and glycerol on protein bound sulfhydryl groups during acute renal failure. Abstracts of the American Society of Nephrology. p. 97A, 1980.
66. Weiner, M.W., Burke, K., Green, K., Wemmer, D., Wade-Jardetsky, N., and Jardetsky, O.: Feasibility of using ^{31}P NMR to study kidney metabolism *in vivo*. Abstracts of the American Society of Nephrology. p. 120A, 1980. Presented at the 13th Annual Meeting of the American Society of Nephrology. November 1980.
67. Weiner, M.W., Pomerantz, S., Burke, K., Green, K., Bendel, P., Murphy, J., Basus, V. and James, T.: Measurement of renal phosphate metabolism *in vivo* using ^{31}P NMR. Clinical Research 29:74A, 1981.
68. Weiner, M.W., Pomerantz, S., Burke, K., Green, K., Bendel, P., and James, T.: Measurement of renal phosphate metabolism *in vivo* using ^{31}P NMR. Abstracts. American Society of Nephrology, 1981.
69. Weiner, M.W., Pomerantz, S., Bendel, P., and James, T.: Feasibility of ^{31}P NMR to study metabolism: Effects of renal ischemia *in vivo* Abstract of the Tel Aviv Satellite Symposium on Acute Renal Failure, 1981. Presented at the Tel Aviv Satellite Symposium on Acute Renal Failure, 1981.

Curriculum Vitae - Michael W. Weiner, M.D.

70. Strauss, W., Koretsky, A., James, T., and Weiner, M.W.: Measurement of phosphorous metabolites of kidney *in vivo* with ^{31}P NMR. Clinical Research 30:80A, 1982.
71. Jacobs, C., McGarrey, K., Rich, L., and Weiner, M.W.: Secretion of cisplatin and effects of probenecid: Human and rat kidney slice studies. Abstract 73rd Ann. Meeting Amer. Asso. Canc. Res., p.126, 1982. Presented at meeting.
72. Koretsky, A., James, T., and Weiner, M.W.: Continuous measurement of high-energy phosphate compounds *in vivo* with NMR. Clinical Research 30:397A, 1982. Presented at National Meeting of Am. Fed. for Clinical Research, May 1982.
73. Lazarus JM, Henderson LW, Kjellstrand CM, Weiner MW, Henrich WL, Hakim RM.: Cardiovascular instability during hemodialysis. Trans Am Soc Artif Intern Organs, 28:656-65, 1982.
74. Koretsky, A.P., Murphy-Boesch J., Wang, S., Klein, M.P., James T.L. and Weiner, M.W: The use of implanted rf coils to obtain ^{31}P NMR spectra of rat kidney and heart *in vivo* Abst. 24th Experimental NMR conference p. 50A 1983. Presented at meeting.
75. Koretsky, A.P., Wang, S., Klein, M.P., James, T.L., and Weiner, M.W.: ^{31}P NMR measurements of phosphorous exchange reactions of heart and kidney. Abst, Soc Mag Reson in Med p.199, 1983. Presented at meeting.
76. Koretsky, A.P., James, T., and Weiner M.W.: Measurement of ATP turnover in the rat kidney *in vivo* by ^{31}P NMR. Abstract, Amer Soc. Nephrol, 1983. Presented at meeting.
77. Weiner, M.W., Koretsky, A.P., James, T.L., and Klein, M.: Noninvasive measurement of high-energy phosphate kinetics *in vivo* by NMR. Clin. Res. 1984. Presented at meeting.
78. Koretsky, A.P., Basus, V.J., James, T.L., Klein, M.P., and Weiner, M.W: Comparison of saturation transfer and 2D NMR to detect small exchangeable pools of metabolites. Biophys. J. 45, 32a, 1984. Presented at 1984 Biophys. Soc. Meeting.
79. Koretsky, A.P., Wang, S., James, T., Klein, M., Parmley, W. and Weiner, M.W.: ^{31}P NMR measurement of high-energy phosphate metabolism of the heart *in vivo*. Clin Res 32:180 A, 1984. Presented at 1984 AFCR, ASCL, AAP.
80. Koretsky, A.P., Klein, M.P., James, T.L. and Weiner, M.W.: Quantitation of competing reactions and detection of small metabolite pools using magnetization transfer techniques: application to creatine kinase kinetics. Abst. Soc. Mag. Reson. Med. p.431, 1984. Presented at meeting.
81. Giannini, D.G., James, T.L., Layzer, R.B., Miller, R.G., Milner-Brown, H.S., Murphy-Boesch, J., and Weiner, M.W.: Quantitative Correlation between electrical/mechanical

Curriculum Vitae - Michael W. Weiner, M.D.

- activity and high-energy phosphates during fatigue and recovery of human hand muscle. Abst. Soc. Magn Reson. Med. p.263. 1984. Presented at meeting.
82. Adam, W.R., Koretsky, A.P. and Weiner, M.W.: ^{31}P NMR measurement of renal pH *in vivo*: effects of acidosis and potassium depletion. Abst. Soc. Mag. Reson. Med. p.3, 1984. Presented at meeting.
83. Koretsky, A.P., Klein, M.P., James, T.L., and Weiner, M.W.: Investigation of phosphate reactions in kidney and heart *in vivo*: role of competing reactions and small metabolite pools. Abst. Soc. Mag. Res. Med. p.429, 1984. Presented at meeting.
84. Koretsky, A.P., Adam, W.R., and Weiner, M.W.: ^{39}K NMR of kidney and muscle of rats *in vivo*. Abst Am. Soc. Nephrol. p.215A, 1984. Presented at meeting.
85. W. R., Koretsky, A.P., and Weiner, M.W.: Measurement of renal pH by Effects of acidosis and potassium depletion. Abst. Am. Soc. Nephrol. p.179A, 1984.
86. Koretsky, A.P, Xuan, A., and Weiner, M.W: Stoichiometric relationship between oxygen consumption, Na reabsorption and ATP synthesis of the kidney *in vivo*. Abst. Soc. Am Nephrol. p.175A, 1984.
87. Adam, W.R., Koretsky, A.P., and Weiner, M.W.: Measurement of renal intracellular pH (pHi) by ^{31}P NMR Nuclear Magnetic Resonance: Effects of acute and chronic respiratory acidosis Clinical Research 33: No. 2, 1985. Presented at meeting.
88. Adam, W.R., Koretsky, A.P., and Weiner, M.W.: Effects of acid-base disturbances on renal intracellular pH: Relationship to regulation of renal ammoniogenesis. Abst. Soc. Mag. Res. Med. p.424, 1985. Presented at meeting.
89. Hooper, D., Miller, R., Layzer, R., Giannini, D., Milner-Brown, S., Koretsky, A.P., and Weiner, M.W.: Correlation between high-energy phosphates and fatigue in human muscle. Abst. Soc. Mag. Res. Med. p.481, 1985. Presented at meeting.
90. Jalles, N., Koretsky, A.P., Ebert, C., Karczmar, G. and Weiner, M.W.: Effects of catecholamines on high-energy phosphates of rat heart *in vivo*. Abst. Soc. Mag. Res. Med. p.485, 1985. Presented at meeting.
91. Karczmar, G.S., Kurtz, T., Jalles, N., Morris, R.C., and Weiner, M.W.: Effects of fructose on liver phosphates. Abst. Soc. Mag. Res. Med. p.491, 1985. Presented at meeting.
92. Shine, N.R., Xuan, J.A., Koretsky, A.P., and Weiner, M.W.: Role of high-energy phosphates in regulating renal sodium transport: Measurement of absolute molar concentrations and effects of cyanide. Abst. Soc. Mag. Res. Med. p.538, 1985. Presented at meeting.

Curriculum Vitae - Michael W. Weiner, M.D.

93. Adam, W.R., Koretsky, A.P., and Weiner, M.W.: Measurement of tissue potassium *in vivo* by ^{39}K NMR. Abst. Soc. Mag. Res. Med. p.745, 1985. Presented at meeting.
94. Karczmar, G.S., and Weiner, M.W.: Spatial localization with a single acquisition: A technique for shimming and spectroscopy. Abst. Soc. Mag. Res. Med. p.997, 1985. Presented at meeting.
95. Murphy-Boesch, J., Moseley, M.E., Young, G.B., Koretsky, A.P., Gonzalez-Mendez, R., Chew, M.W., Weiner, M.W., Litt, L., and James, T.L.: A multinuclear NMR spectrometer for *in vivo* imaging and spectroscopy at 5.6 tesla. Abst. Soc. Mag. Res. Med. p.1112, 1985. Presented at meeting.
96. Shine, N., Xuan, A., and Weiner, M.W.: Relationship of renal ATP to sodium transport. Abst. Am. Soc. Nephrol. p.210a, 1985.
97. Miller, R. G., Milner-Brown, H.S., Hooper, D., Layzer, R.B. and Weiner, M.W.: Long duration muscle fatigue caused by impaired excitation-contraction coupling. Abst. Soc. Neuroscience 11:210, 1985. Presented at meeting.
98. Miller, R.G., Milner-Brown, H.S., Layzer, D., Hooper, D., and Weiner, M.W.: A new method of studying human muscle fatigue: correlation of force/EMG and nuclear magnetic resonance spectroscopy. Abst. Muscle and Nerve 8:623, 1985.
99. Jalles-Tavares, N., Karczmar, G., Wheeler, C., Koretsky A., and Weiner, M.W.: Catecholamine infusion diminishes high-energy phosphates of the rat heart *in vivo*. Clin. Res. 34:8A and 311A, 1986. Presented at Western Section AFCR and at National Meeting AFCR.
100. Jalles-Tavares, N., Karczmar, G.S., and Weiner, M.W.: ^{31}P T2s in rat intestine and kidney *in vivo*: Use of solenoidal coils for homogenous excitation. Abst. Soc. Mag. Res. Med., p.989, 1986. Presented at meeting.
101. Karczmar, G.S., Weiner, M.W., and Matson, G.B.: Detection of residual Z magnetization improves the sensitivity of the surface coil rotating frame method. Abst. Soc. Mag. Res. Med., p.852, 1986. Presented at meeting.
102. Shine, N., Xuan, J.A., and Weiner M.W.: Simultaneous measurement of Pi-ATP exchange, oxygen consumption and sodium reabsorption of the rat kidney *in vivo*: Effects of atrial natriuretic factor. Abst. Soc. Mag. Res. Med., p.1021, 1986. Presented at meeting.
103. Boska, M., Moussavi R., Miller, R., Layzer, R., and Weiner, M.W.: Relationship between H^+ and fatigue during exercise of human muscle: Comparison of intermittent and sustained contraction. Abst. Soc. Mag. Res. Med., p.446, 1986. Presented at meeting.

Curriculum Vitae - Michael W. Weiner, M.D.

104. White, D.L., Engelstad, B.L. Brennan, R., Brasch, R., and Weiner, M.W.: Effects of paramagnetic agents on ^{31}P NMR spectra: Signal enhancement by reduction of Tl. Abst. Soc. Mag. Res. Med., p.331, 1986. Presented at meeting.
105. Vink, R., McIntosh, T.K., Agura, V.M., Fernyak, S.E., Weiner, M.W., and Faden, A.L.: Effects of traumatic injury on brain high-energy phosphates and pH. Abst. Soc. Mag. Res. Med., p.1374, 1986. Presented at meeting.
106. Toy, B.J.W., Gollin, G., and Weiner, M.W.: ^{31}P NMR of transplanted rat heart: Effects of ischemia and rejection. Abst. Soc. Mag. Res. Med., p. 614, 1986.
107. Anderson, C., Shine, N., Matson G., Tavares, N., Luyten, P., DenHollander, J., and Weiner M.W.: ^{31}P NMR of testicle in rat and man: Application to testicular torsion. Abst. Soc. Mag. Res. Med., p.1027, 1986. Presented at meeting.
108. Karczmar, G.S., Jalles-Tarvares, N., and Weiner, M.W.: ^{31}P NMR of the small and large intestine: Effects of fructose and ischemia. Abst. Soc. Mag. Res. Med., p.914, 1986. Presented at meeting.
109. Moussavi, R.S., Boska, M.D., Weiner, M.W., Layzer, R.B., and Miller, R.G.: Recovery of post -tetanic potentiation in human muscle after fatigue. Abst. Soc. Neuroscience, 1986. Presented at meeting.
110. Shine, N.J., Palladino, D., Deisseroth, A., and Weiner, M.W.: Effects of tumor necrosis factor on high-energy phosphates of an experimental mouse tumor. Radiology 161(P):340. Presented at RSNA 1986.
111. Lanzer, P., Toy B., Botvinick, E., Camacho, A., Verrier, E., Hickey R., and Weiner, M.W.: Effects of myocardial ischemia and reperfusion on cardiac phosphates and pH. Radiology 161(P):340. Presented at RSNA 1986.
112. Karczmar, G.S., Weiner, M.W., and Matson, G.B.: A single acquisition localization technique using B_1 gradients. Presented at 27th Experimental NMR Conference. 1986.
113. Lanzer, P., Camacho, A., Toy B.J., Mazer, D., Botvinick, E., and Weiner, M.W.: Metabolic and functional recovery after transient myocardial ischemia in pigs studied by ^{31}P NMR. Abstract, Presented at the 36th Annual Scientific Session, Amer Col Cardiol, 1987.
114. Miller, R.G., Moussavi, R.S., Boska, M.D., and Weiner, M.W.: Impaired excitation-contraction coupling causes long duration fatigue. Presented at the VIII International Congress of Electromyography and Related Clinical Neurophysiology. Sorrento, Italy, May 1987.
115. Shine, N.J., Palladino, D., Deisseroth, A., and Weiner, M.W.: Effects of tumor necrosis factor on high-energy phosphates of an experimental mouse tumor. Abstract, Clin Res 35:169A,

Curriculum Vitae - Michael W. Weiner, M.D.

- 528A, 1987. Presented at Western Section AFCR, Carmel, CA, and National Meeting AFCR, San Diego, CA, 1987.
116. Toy, B.J.W., Lanzer, P., Gollin, G., Camacho, A., Botvinick, E., and Weiner, M.W.: Effects of rejection and ischemia on cardiac metabolism. *Abst. Clin. Res.* 35:114A, 330A, 1987. Presented at Western Section AFCR, Carmel, CA, and National Meeting AFCR, San Diego, CA, 1987.
117. Miller, R.G., Boska, M.D., Moussavi, R.S., and Weiner, M.W.: Role of pH and phosphate in human muscle fatigue. *Abst. Clin Res* 35:155A, 1987. Presented at Western Section AFCR, Carmel, CA, and National Meeting AFCR, San Diego, CA, 1987.
118. Shine, N.J., Xuan, J.A., and Weiner, M.W.: Role of ATP in renal sodium transport: Evidence for compartmentation. *Clin Res* 35:176A, 1987. Abst. Presented at Western Section AFCR, Carmel, CA, and National Meeting AFCR, San Diego, CA, 1987.
119. Roth, K., Hubesch, B., Naruse, S., Meyerhoff, D.J., Boska, M.D., Matson, G.B., and Weiner, M.W.: Quantitative determination of molar concentrations of metabolites in human subjects. *Abst.* Presented at Western Section AFCR, Carmel, CA, and National Meeting AFCR, San Diego, CA, 1987.
120. Meyerhoff, D.J., Rockey, D., Karczmar, G.S., Boska, M.D., Matson, G.B., and Weiner, M.W.: ^{31}P magnetic resonance spectroscopy (MRS) of normal human liver and kidney. *Abst.* Presented at Western Section AFCR, Carmel, CA, and National Meeting AFCR, San Diego, CA, 1987.
121. Karczmar, G.S., Lawry, T., Weiner, M.W., Murphy-Boesch, J., and Matson, G.B.: Tailored excitation in the rotating frame. *Abst.* Presented at 28th Experimental NMR Conference, Asilomar, CA, April 5-9, 1987.
122. McIntosh, T.K., Vink R., Weiner, M.W., and Faden, A.I.: Alterations in Free Magnesium, High-Energy Phosphates, and Lactate Following Traumatic Brain Injury: Assessment by Nuclear Magnetic Resonance Spectroscopy. *Abst. J. Cerebral Blood Flow and Metabolism* 7(1):S620, 1987. Presented at XII International Symposium on Cerebral Blood Flow and Metabolism.
123. Miller, R.G., Boska, M., Moussavi, R., and Weiner, M.W.: Intracellular pH and human muscle fatigue: quantitative studies with ^{31}P NMR. *Abst.*, *Neurology* 37(Suppl 1), 1987.
124. Matson, G.B., Twieg, D.B., Karczmar, G.S., Lawry, T., Gober, J., Valenza, M., Boska, M., and Weiner, M.W.: Spatially selected ^{31}P NMR of human organs with surface coils: Improvement of ISIS with a composite pulse. *Abst. Soc. Magn. Reson. Med.*, p.605, 1987. Presented Soc Magn Reson Med VIth Annual Meeting.

Curriculum Vitae - Michael W. Weiner, M.D.

125. Roth, K., Hubesch, B., Naruse, S., Gober, J., Lawry, T., Boska, M., Matson, G., and Weiner, M.W.: Quantitation of metabolites in human brain using volume selected ^{31}P NMR. Abst., Soc. Magn. Reson. Med., p.608, 1987. Presented Soc Magn Reson Med VIth Annual Meeting.
126. Arbeit, J.M., Toy, J.B., and Weiner, M.W.: Selective effects of insulin-induced hypoglycemia on ATP concentrations of tumors: Protection of brain metabolism by fasting. Abst. Soc. Magn. Reson. Med., p.64, 1987. Presented Soc Magn Reson Med VIth Annual Meeting.
127. Matson, G.B., Lawry, T.J., and Weiner, M.W.: Optimization of surface coil size through computer modeling. Abst. Soc. Magn. Reson. Med., p.843, 1987.
128. Shine, N.J., Palladino, M., Deisseroth, A., Karczmar, G., Matson, G., and Weiner, M.W.: Effects of tumor necrosis factor on high-energy phosphates of an experimental mouse tumor. Abst. Soc. Magn. Reson. Med., p.35, 1987. Presented Soc Magn Reson Med VIth Annual Meeting.
129. Moussavi, R.S., Boska, M.D., Carson, P.J., Weiner, M.W., and Miller, R.G.: Dissociation between metabolites and excitation-contraction coupling in human muscle fatigue. Abst. Soc. Magn. Reson. Med., p.1033, 1987.
130. Carson, P.J., Moussavi, R.S., Miller, R.G., and Weiner, M.W.: Evidence for a constant relationship between fatigue, high-energy phosphates, and pH in different muscle types and in varying forms of exercise. Abst. Soc. Magn. Reson. Med., p.583, 1987. Presented Soc Magn Reson Med VIth Annual Meeting.
131. Roth, K., and Weiner, M.W.: An improved approach for determination of ADP, AMP, phosphorylation potential and G. (ATP) from ^{31}P NMR. Abst. Soc. Magn. Reson. Med. p.205, 1987. Presented Soc Magn Reson Med VIth Annual Meeting.
132. Miller, R.G., Boska, M.D., Moussavi, R.S., Carson, P.J., and Weiner, M.W.: Accumulation of monovalent phosphate closely correlates with human muscle fatigue. Abst. Soc. Magn. Reson. Med., p.1034, 1987. Presented Soc Magn Reson Med VIth Annual Meeting.
133. Toy, B.J., Lanzer, P., Camacho, A., Valenza, M., Gober, J., Karczmar, G.S., Botvinick, E., Massie, B., Matson, G.B., and Weiner, M.W.: Effects of increased work and ischemia on ^{31}P NMR spectra of pig myocardium. Abst. Soc. Magn. Reson. Med., p.1018, 1987.
134. Lawry, T.J., Boska, M.D., Matson, G.B., and Weiner, M.W.: Optimization of two coil depth pulse experiments. Abst. Soc. Magn. Reson. Med., p.960, 1987.
135. Karczmar, G.S., Lawry, T., Murphy-Boesch, J., Weiner, .W., and Matson, G.B.: Rotating frame shaped pulses. Abst. Soc. Magn. Reson. Med., p.955, 1987.

Curriculum Vitae - Michael W. Weiner, M.D.

136. Karczmar, G.S., Lawry, T., Shine, N., Weiner, M.W., and Matson, G.B.: Detection of residual Z magnetization applied to the rotating frame experiment. *Abst. Soc. Magn. Reson. Med.*, p.956, 1987.
137. Nagai, Y., Naruse, S., Vink, R., and Weiner, M.W.: Evidence that lactate accumulation is not completely responsible for acidosis during cerebral ischemia. *Abstract, Soc. Magn. Res. Med.* 1987. Presented Soc Magn Reson Med VIth Annual Meeting.
138. Roth, K., Naruse, S., Hubesch, B., Gober, J., Lawry, T., Boska, M., Matson, G.B., and Weiner, M.W.: Measurement of ^{31}P NMR relaxation times and concentrations in human brain and brain tumors. *Radiology* 165(P):39, 1987. Presented RSNA.
139. Matson, G.B., Lawry, T. Twieg, D., Karczmar, G., Gober, J., Boska, M., and Weiner, M.W.: Three-dimensional image-selected ^{31}P NMR of human liver, kidney and heart. *Abst, Radiol. Soc. N. Amer. Radiology* 165(P):125, 1987. Presented RSNA.
140. Miller, R.G., Carson, P.J., Moussavi, R.S., and Weiner, M.W.: MR spectroscopy studies of human muscle fatigue. *Radiology* 165(P):60, 1987. Presented, RSNA.
141. Arbeit, J.M., Toy, J.B., and Weiner, M.W.: MR spectroscopy studies of tumor adenosine triphosphate during inhibition of glycolysis and respiration. *Radiology* 165(P):186, 1987. Presented RSNA.
142. Nagai, Y., Naruse, S., Vink, R., and Weiner, M.W.: Role of lactate in ischemic acidosis. *Radiology* 165(P):303, 1987. Presented RSNA.
143. Schaefer, S., Gober, J., Valenza, M., Karczmar, G., Matson, G., Camacho, A., Botvinick, E., Massie, B., and Weiner, M.W.: MRI guided phosphorous 31 spectroscopy of the human left ventricle. *Clinical Research* 36:114A, 1987.
144. Hubesch, B., Roth, K., Meyerhoff, D.J., Lawry, T., Matson, G.B., and Weiner, M.W.: Quantitation of metabolites in human organs from ^{31}P NMR spectra obtained with surface coils. *Soc. Magn. Reson. Med* 1987. Presented.
145. Weiner, M.W. and Matson, G.: Image-localized ^{31}P nuclear magnetic resonance spectra of the orthotopic and transplanted human kidney. *Kidney International* 33(1):397, 1987. Presented ASN Annual Meeting, 1988.
146. Arbeit, J.M., Toy, B.J., Karczmar, G.S., and Weiner, M.W.: Selective effects of insulin-induced hypoglycemia and rhodamine-123 on tumor energy metabolism. *Clin Res* 36(1):167A, 1987.
147. Miller, R.G., Carson, P.J., Moussavi, M.S., and Weiner, M.W.: Magnetic resonance spectroscopy (MRS) of human muscle fatigue. *Radiology* 165(P):60, 1987.

Curriculum Vitae - Michael W. Weiner, M.D.

148. Lanzer, P., Camacho, S.A., Toy, B.J., Valenza, M., Gober, J., Botvinick, E.H., and Weiner, M.W.: Myocardial energetics and contractility during regional ischemia: a ^{31}P NMR study. Abst. 60th Scientific Sessions, American Heart Association (Presented), 1987.
149. Arbeit, J., Toy, B., and Weiner, M.: Effect of insulin-induced hypoglycemia on rodent tumor and brain energy metabolism determined by ^{31}P MRS. Asso. Acad. Surg. 1987. Presented.
150. Moussavi, R., Carson, P., Boska, M., Weiner, M., and Miller, R.: The role of impaired excitation-contraction coupling in fatigue. Neurology 38(1):202, 1988.
151. Miller, R.G., Carson, P.J., Moussavi, R.S., and Weiner, M.W.: MR spectroscopy studies of human muscle fatigue. Clin Res 36(1):142A, 1988.
152. Schaefer S, Gober J, Valenza M, Karczmar G, Matson G, Massie B, and Weiner MW: Image-guided phosphorus 31 spectroscopy of the human heart. Soc Magn Reson Imaging 6(1):339, p.100, 1988. Presented SMRI.
153. Arbeit, J.M., Toy B.J., Karczmar, G.S., and Weiner, M.W.: Selective effects of insulin-induced hypoglycemia and rhodamine-123 on tumor energy metabolism. Soc. Magn. Reson. Imaging, 6(1):333, p.97 1988. Presented SMRI.
154. Meyerhoff, D.J., Rockey, D., Boska, M., Matson, G., Weiner, M.W.: ^{31}P magnetic resonance spectroscopy (MRS) of normal human liver and kidney. Soc. Magn. Reson. Imaging 6(1):P55, p.28, 1988. Presented.
155. Meyerhoff, D.J., Rockey, D., Boska, M., Matson, G., Weiner, M.: ^{31}P magnetic resonance spectroscopy (MRS) of normal human liver and kidney. Clin. Res. 36(1):175A, 1988.
156. Matson, G., Boska, M., Karczmar, G., Twieg, D., Adams, D, Buchanan, J., Healy, M., Anderson, C., and Weiner, M.W.: Comparison of magnetic resonance imaging (MRI) and spectroscopy (MRS) at 1.5 and 2.0 T. Soc. Magn. Reson. Imaging 6(1):417, p.113, 1988. Presented.
157. Karczmar, G.S., Twieg, D.B., Lawry, T.J., Matson, G.B., and Weiner M.W.: NMR detection of motion using RF field gradients. Soc Magn Reson Imaging 6(1):P34), p.18, 1988. Presented.
158. Miller, R.G., Carson, P.J., Moussavi, R.S., and Weiner, M.W.: Magnetic resonance spectroscopy (MRS) of human muscle fatigue. Clinical Research 36:142A, 1988.
159. Arbeit, J.M., Toy B.J., Karczmar, G.S., and Weiner, M.W.: Selective effects of insulin-induced hypoglycemia and rhodamine-123 on tumor energy metabolism. Clinical Research 36:167A, Presented ACSR Western Meeting 1988.

Curriculum Vitae - Michael W. Weiner, M.D.

160. Meyerhoff, D.J., Rockey, D., Boska, M., Matson, G., Weiner, M.W.: ^{31}P magnetic resonance spectroscopy (MRS) of normal human liver and kidney. Clinical Research 36:175A. Presented AFCR Western Meeting 1988.
161. Schaefer, S., Gober, J., Valenza M., Karczmar, G., Matson, G., and Camacho, A.: Magnetic resonance imaging guided phosphorous 31 spectroscopy of the human heart. Clinical Research 36:114A. Presented AFCR Western Meeting, 1988.
162. Camacho, S.A., Schaefer, S., Gober, J.R., Obregon, R., DeGroot, M.A., Botvinick, E.H., Massie, B.M., and Weiner, M.W.: The bioenergetic response to graded reductions in myocardial blood flow. Presented Amer Heart Assoc 61st Scientific Session, November 14-17, 1988.
163. Arbeit, J.M., Karczmar, G.S., Toy, B.J., Speder, A., and Weiner, M.W.: Selective additive reduction of rodent sarcoma ATP by insulin hypoglycemia combined with inhibition of oxidative phosphorylation. Society of Magnetic Resonance in Medicine, p.625, 1988. Presented SMRM VIIth Annual Meeting.
164. Boska, M.D., Twieg, D.B., Karczmar, G.S., Meyerhoff, D.J., Saprey-Marinier, D., Matson, G.B., and Weiner, M.W.: Localized ^{31}P MRS of human orthotopic and transplanted kidney using ISIS and spectroscopic imaging. Society of Magnetic Resonance in Medicine, p.350, 1988. Presented SMRM VIIth Annual Meeting.
165. Boska, M.S., Karczmar, G.S., Hubesch B., Meyerhoff, D.J., Twieg, D.B., Matson, G.B., and Weiner, M.W.: Comparison of ^{31}P MRS and proton MRI at 1.5 T and 2.0 T. Society of Magnetic Resonance in Medicine, p.349, 1988. Presented SMRM VIIth Annual Meeting.
166. Twieg, D.B., Meyerhoff, D.J., Gober, J., Boska, M.D., Hubesch, B., Schaefer S, Roth, K., Saprey-Marinier, D., and Weiner, M.W.: An improved spectroscopic imaging (SI) technique for localized phosphorus NMR spectroscopy: direct comparison of SI and ISIS in human organs. Society of Magnetic Resonance in Medicine, p.710, 1988. Presented SMRM VIIth Annual Meeting.
167. Karczmar, G.S., Poole, J., Boska, M.D., Meyerhoff D.J., Hubesch, B., Roth, K., Matson, G.B., Arbeit, J.A., Valone, F., and Weiner, M.W.: ^{31}P MRS study of response of human tumors to therapy. Society of Magnetic Resonance in Medicine, p.615, 1988. Presented SMRM VIIth Annual Meeting.
168. Schaefer, S., Gober, J., Camacho, S., Botvinick, E.H., Massie, B.M., and Weiner, M.W.: ^{31}P MRS of normal and diseased human myocardium: Localization with ISIS and MRSI. Society of Magnetic Resonance in Medicine, p.296, 1988. Presented SMRM VIIth Annual Meeting.
169. Gober, G., Schaefer, S., Camacho, A., DeGroot, M., Obregon, R., Botvinick, E., Weiner, M.W., and Massie, B.: Epicardial and endocardial localized ^{31}P MRS during partial regional

Curriculum Vitae - Michael W. Weiner, M.D.

- ischemia: Evidence for metabolic heterogeneity. Society of Magnetic Resonance in Medicine, p.831, 1988. Presented SMRM VIIth Annual Meeting.
170. Camacho, S.A., Schaefer, S., Gober, J., Obregon, R., DeGroot, M.A., Botvinick, E.H., Massie, B.M., and Weiner, M.W.: High energy phosphates are a sensitive marker of reduced myocardial blood flow during partial coronary occlusion. Society of Magnetic Resonance in Medicine, p.272, 1988. Presented SMRM VIIth Annual Meeting.
171. Miller, R.G., Moussavi, R.S., Boska, M.D., and Weiner, M.W.: Differences between bioenergetics of fatigue and recovery suggest a primary role of H₂PO₄⁻ in human muscular fatigue. Society of Magnetic Resonance in Medicine, p.31, 1988. Presented SMRM VIIth Annual Meeting.
172. Lawry, T.J., Twieg, D.B., Maudsley, A., Weiner, M.W., and Matson, G.B.: Computer simulation of MRS localization: Comparison of ISIS and spectroscopic imaging (SI) techniques. Society of Magnetic Resonance in Medicine, p.944, 1988. Presented SMRM VIIth Annual Meeting.
173. Hubesch, B., Sapppay-Marinier, D., Roth, K., Sanuki, E., Hodes, J.E., Matson, G.B., and Weiner, M.W.: Improved ISIS for studies of human brain and brain tumors. Society of Magnetic Resonance in Medicine, p.348, 1988. Presented SMRM VIIth Annual Meeting.
174. Hubesch, B., Sapppay-Marinier, F., Hodes, J.E., and Weiner, M.W.: Increased ³¹P T₁ Relaxation Times in Human Brain Tumor. Soc Magn Reson Med, p.64, 1988. Presented SMRM VIIth Annual Meeting.
175. Meyerhoff, D.J., Boska, M.D., Thomas, A., Twieg, D.B., Rockey, D., and Weiner, M.W.: Decreased phosphorus metabolite concentration in acute alcoholic hepatitis and cirrhosis of the liver - ³¹P MRS with ISIS and spectroscopic imaging. Society of Magnetic Resonance in Medicine, p.621, 1988. Presented SMRM VIIth Annual Meeting.
176. Moussavi, R.S., Carson, P.J., Boska, M.D., Weiner, M.W., and Miller, R.G.: The role of impaired excitation-contraction coupling in fatigue. Neurology 38(Suppl 1):202, 1988.
177. Miller, R.G., Moussavi, R.S., Carson, P.J., Boska, M.D., and Weiner, M.W.: A newly recognized cause of human muscle fatigue: accumulation of monovalent phosphate. Neurology 38(Suppl 1):290, 1988.
178. Camacho, S.A., Schaefer, S., Gober, J., Obregon, R., DeGroot, M.A., Botvinick, E.H., Massie, B.M., and Weiner, M.W.: Localized P-31 spectroscopy of graded myocardial ischemia. Radiology 169(P):179, 1988. Presented 74th Annual RNSA.
179. Hubesch, B., Sapppay-Marinier, D., Roth, K., Sanuki, E., Hodes, J.E., Matson, G.B., and Weiner, M.W.: MR spectroscopic studies of human brain tumors. Radiology 169(P):84, 1988. Presented 74th Annual RNSA.

Curriculum Vitae - Michael W. Weiner, M.D.

180. Meyerhoff, D.J., Boska, M., Thomas, A., Twieg, D., Rockey, M., and Weiner, M.W.: P-31 MR spectroscopy of alcoholic liver disease. Radiology 169(P):238, 1988. Presented 74th Annual RNSA.
181. Twieg, D., Meyerhoff, D.J., Gober, J., Boska, M., Hubesch, B., Schaefer, S., Roth, K., Saprey-Marinier, D., and Weiner, M.W.: Comparison of single-point MR spectroscopic and multiple-point spectroscopic imaging in human organs. Radiology 169(P):238, 1988. Presented 74th Annual RNSA.
182. Karczmar, G.K., Poole, J., Boska, M.D., Meyerhoff, D.J., Hubesch, B., Roth, K., Matson, G.B., Arbeit, J., Valone, F., and Weiner, M.W.: ^{31}P MRS study of response of human tumors to therapy. Magnetic Resonance Imaging 7:31, 1989. Presented SMRI Annual Meeting.
183. Meyerhoff, D.J., Thomas, A., Boska, M.D., Rockey, D., and Weiner, M.W.: Alcoholic hepatitis, alcoholic cirrhosis, and viral hepatitis - A comparison using fully quantitative image-guided localized ^{31}P MRS (ISIS). Magnetic Resonance Imaging 7:30, 1989. Presented SMRI Annual Meeting.
184. Schaefer, S., Gober, J., Twieg, D.B., Schwartz, G.S., Weiner, M.W., and Massie, B.: Spectroscopic imaging of normal and diseased human myocardium. Magnetic Resonance Imaging 7:65, 1989. Presented SMRI Annual Meeting.
185. Schaefer, S., Gober, J.R., Camacho, A., Schwartz, G.S., Massie, B., and Weiner, M.W.: Changes in high-energy phosphates and myocardial contractility during graded regional ischemia: An *in vivo* ^{31}P MRS study. Magnetic Resonance Imaging 7:66, 1989. Presented SMRI Annual Meeting.
186. Gober, J.R., Schwartz, G.S., Schaefer, S., Massie, B.M., Matson, G.B., Weiner, M.W., and Karczmar, G.S.: ^{31}P MRS detection of myocardial Pi using motion editing. Magnetic Resonance Imaging 7:187, 1989. Presented SMRI Annual Meeting.
187. Hubesch, B., Karczmar, G.S., Roth, K., Meyerhoff, D.J., Matson, G.B., and Weiner, M.W.: Quantitative measurement of metabolites in human cancers. Tumor Diagnostik and Therapie 9:165, 1988. Presented Symposium on Positron Emission Tomography and Magnetic Resonance Spectroscopy in Oncology, Heldorf, Germany.
188. Arbeit, J.M., Toy, B.J., Karczmar, G.S., Speder, A., and Weiner, M.W.: Effects of inhibiting glycolysis and respiration on tumor ATP *in vivo*. Tumor Diagnostik and Therapie 9:174, 1988. Presented Symposium on Positron Emission Tomography and Magnetic Resonance Spectroscopy in Oncology, Heldorf, Germany.

Curriculum Vitae - Michael W. Weiner, M.D.

189. Zens, A.P., Chingas, G.C., Boska, M.D., Lawry, T.J., and Matson, G.B.: Computer simulations of a double-tuned birdcage coil. Presented Experimental Nuclear Magnetic Resonance Conference, 1989.
190. Gober, J.R., Schwartz, G.G., Schaefer, S., Massie, B., Matson, G.B., Weiner, M.W., and Karczmar, G.S.: ^{31}P MRS detection of myocardial Pi using motion editing. Presented Experimental Nuclear Magnetic Resonance Conference, 1989.
191. Jensen, P.C., Hubesch, B., Parks, R., Deicken, R., Krell, P., Weiner, M.W., et al.: Altered brain metabolites in AIDS dementia as measured by magnetic resonance spectroscopy. Presented Vth International Conference on AIDS, 1989.
192. Miller, R.G., Green, A.T., Moussavi, R.S., Carson, P.J., and Weiner, M.W.: Metabolic correlates of fatigue in patients with upper motor neuron lesions. Neurology 39:144, 1989. Presented AAN Scientific Program.
193. Schaefer, S., Gober, J.R., Camacho, S.A., Schwartz, G., Botvinick, E.H., Massie, B., and Weiner, M.W.: Changes in high energy phosphates and myocardial contractility during graded regional ischemia: an *in vivo* ^{31}P Phosphorus magnetic resonance spectroscopy study. Clin. Res. 37:100A, 1989. Presented Western Section AFCR.
194. Meyerhoff, D.J., Thomas, A., Boska, M.D., and Weiner, M.W.: Fully quantitative ^{31}P magnetic resonance spectroscopy in the evaluation of liver disease. Clin. Res. 37:113A, 1989. Presented Western Section AFCR.
195. Karczmar, G.S., Poole, J., Boska, M.D., Meyerhoff, D.J., Hubesch, B., Karczmar, G.S., Arbeit, J., Valone, F., and Weiner, M.W.: ^{31}P Phosphorus magnetic resonance spectroscopy study of response of human tumors to therapy. Clin. Res. 37:143A, 1989.
196. Schwartz, G., Gober, J.R., Meyerhoff, D.J., Schaefer, S., Massie, B. and Weiner, M.W.: Relationship between myocardial high-energy phosphates, contractile function, and coronary blood flow during and following brief coronary occlusion in the pig. Abstract. Society of Magnetic Resonance in Medicine, p.1004. Presented at the Eighth Annual Meeting, 1989.
197. Meyerhoff, D.J., Thomas, A., Boska, M., and Weiner, M.W.: Alteration of pH and phosphorus metabolite concentrations in alcoholic hepatitis and cirrhosis. Abstract, Society of Magnetic Resonance in Medicine, p.1567. Presented at the Eighth Annual Meeting, 1989.
198. Schaefer, S., Gober, J.R., Schwartz, G., Meyerhoff, D.J., Weiner, M.W., and Massie, B.: ^{31}P spectroscopic imaging of patients with global myocardial disease: elevated phosphodiesters in patients with left ventricular dilation. Abstract. Society of Magnetic Resonance in Medicine, p. 513. Presented at the Eighth Annual Meeting, 1989.
199. Schaefer, S., Schwartz, G., Wong, A.K., Camacho, A., Botvinick, E.H., Massie, B., and Weiner, M.W.: Regulation of myocardial contractility during graded regional ischemia: ^{31}P

Curriculum Vitae - Michael W. Weiner, M.D.

- NMR spectroscopy of porcine myocardium *in vivo*. Abstract, Society of Magnetic Resonance in Medicine, p.514. Presented at the Eighth Annual Meeting, 1989.
200. Thomas, M.A., Narayan, P., Jajodia, P., Kurhanewicz, J. and Weiner, M.W.: Measurement of citrate by ^1H MRS in human prostate and prostate cancer *in vivo*. Abstract. Society of Magnetic Resonance in Medicine, p.1088. Presented at the Eighth Annual Meeting, 1989.
201. Hetherington, H., Boska, M.D., Matson, G.B., and Weiner, M.W.: An improved ^1H ISIS sequence for volume localized human spectroscopy with homogeneous coils: the detection of resting lactate levels. Abstract, Society of Magnetic Resonance in Medicine, p.638. Presented at the Eighth Annual Meeting, Amsterdam, 1989.
202. Hetherington, H., Rowley, H., Peterson, K., Boska, M., Diamond, I., and Weiner, M.W.: The kinetics of ethanol uptake in human brain and blood by volume selective ^1H MRS. Abstract, Society of Magnetic Resonance in Medicine, p.370. Presented at the Eighth Annual Meeting, 1989.
203. Hetherington, H., Sappey-Marinier, D., Hubesch, B., Deicken, R., Fein, G., and Weiner, M.W.: Characterization of tissue metabolites in chronic stroke and deep white matter lesions by localized ^1H MRS. Abstract, Society of Magnetic Resonance in Medicine, p.446. Presented at the Eighth Annual Meeting, 1989.
204. Gober, J.R., Schwartz, G., Schaefer, S., Massie, B., Matson, G.B., Weiner, M.W., and Karczmar, G.S.: Detection of myocardial inorganic phosphate and pH using ^{31}P MRS 'motion editing'. Abstract, Society of Magnetic Resonance in Medicine, p.36. Presented at the Eighth Annual Meeting, 1989.
205. Maudsley, A.A., Twieg, D.B., Boska, M.D., Sappey-Marinier, D., Hubesch, B., and Weiner, M.W.: ^{31}P spectroscopic imaging in the human head at 2.0 T. Abstract, Society of Magnetic Resonance in Medicine, p.252. Presented at the Eighth Annual Meeting - Amsterdam, 1989.
206. Hubesch, B., Sappey-Marinier, D., Deicken, R., Seidenwurm, D., and Weiner, M.W.: Regional differences of phosphorus metabolites in the human brain. Abstract, Society of Magnetic Resonance in Medicine, p.447. Presented at the Eighth Annual Meeting, 1989.
207. Hubesch, B., Sappey-Marinier, D., Laxer, K.D., and Weiner, M.W.: Alkalosis in seizure foci of temporal lobe epilepsy. Abstract, Society of Magnetic Resonance in Medicine, p.448. Presented at the Eighth Annual Meeting, Amsterdam, 1989.
208. Haxo, R.S., Lawry, T.J., Karczmar, G.S., Schleich, T., Weiner, M.W., and Matson, G.B.: An optimized, transposed selective RF pulse for the SPARS experiment. Abstract, Society of Magnetic Resonance in Medicine, p.865. Presented at the Eighth Annual Meeting, 1989.

Curriculum Vitae - Michael W. Weiner, M.D.

209. Matson, G.B., Hubesch, B., Lawry, T.J., Meyerhoff, D.J., Saprey-Marinier, D., and Weiner, M.W.: Quantitation of ISIS localized *in vivo* MRS results. Abstract, Society of Magnetic Resonance in Medicine, p.596. Presented at the Eighth Annual Meeting, 1989.
210. Karczmar, G.S., Meyerhoff, D.J., Boska, M.D., Hubesch, B., Matson, G.B., Kaplan, M., Valone, F., Wilkinson, M., and Weiner, M.W.: Response of superficial human tumors to therapy studied by ^{31}P MRS. Abstract, Society of Magnetic Resonance in Medicine, p.432. Presented at the Eighth Annual Meeting, 1989.
211. Karczmar, G.S., Speder, A., and Weiner, M.W.: Acute effects of tumor necrosis factor on tumor metabolism and perfusion. Abstract, Society of Magnetic Resonance in Medicine, p.147. Presented at the Eighth Annual Meeting, 1989.
212. Baker, A.J., Carson, P.J., Green, A.T., Weiner, M.W., and Miller, R.G.: The influence of muscle length on the rate of energy use during sustained contraction. Abstract, Society of Magnetic Resonance in Medicine, p.542. Presented at the Eighth Annual Meeting, 1989.
213. Saprey-Marinier, D., Chileuitt, L., Hetherington, H., Weiner, M.W., and Weinstein, P.: Effect of hypoglycemia on recovery of cerebral lactic acidosis after temporary complete ischemia in rats. Abstract, Society of Magnetic Resonance in Medicine, p.491. Presented at the Eighth Annual Meeting, 1989.
214. Saprey-Marinier, D., Hubesch, B., Deicken, R., Fein, G., Van Dyke, C., and Weiner, M.W.: ^{31}P metabolites in chronic stroke and deep white matter lesions. Abstract, Society of Magnetic Resonance in Medicine, p.1070. Presented at the Eighth Annual Meeting, 1989.
215. Thomas, M.A., Meyerhoff, D.J., Hetherington, H.P., and Weiner, M.W.: Localized proton NMR spectroscopy using double quantum filter. Abstract, Society of Magnetic Resonance in Medicine, p.1115. Presented at the Eighth Annual Meeting, 1989.
216. Thomas, M.A., Kurhanewicz, J., Jajodia P., Karczmar G.S., Hubesch B., Matson, G.B., James, T.L., Narayan, P., and Weiner, M.W.: 31-Phosphorus MR spectroscopy of human prostate *in vivo*. Abstract, Society of Magnetic Resonance in Medicine, p.297. Presented at the Eighth Annual Meeting, 1989.
217. Schaefer, S., Schwartz, G., Gober, J.R., Wong, A.K., Camacho, S.A., Weiner, M.W., and Massie, B.: Relationships between myocardial metabolites and contractile function during graded regional ischemia: ^{31}P NMR of porcine myocardium *in vivo*. Circulation 80(II):613, 1989.
218. Schaefer, S., Schwartz, G., Gober, J.R., Meyerhoff, D.J., Weiner, M.W., and Massie, B.: ^{31}P spectroscopic imaging of global myocardial disease: Elevation of phosphodiesters in patients with left ventricular dilation. Circulation 80(II):588, 1989.

Curriculum Vitae - Michael W. Weiner, M.D.

219. Schwartz, G.G., Schaefer, S., Gober, J., Meyerhoff, D.J., Massie, B., and Weiner, M.W.: Myocardial high-energy phosphate metabolism during brief coronary occlusion and reactive hyperemia in the pig. *Circulation* 80(II):190, 1989.
220. Hetherington, H., Matson, G.B., and Weiner, M.W.: Measurement of lactate and ethanol in human brain with use of ^1H ISIS MR spectroscopy. *Radiology* 173(P):121, 1989. Presented at RSNA.
221. Hubesch, B., Sappey-Marinier, D., Laxer, K., and Weiner, M.W.: Alterations of pH and Pi in seizure foci of temporal lobe epilepsy. *Radiology* 173(P):234, 1989. Presented at RSNA.
222. Karczmar, G.S., Gober, J.R., Schwartz, G., Schaefer, S., Massie, B., Matson, G.B., and Weiner, M.W.: ^{31}P MR spectroscopy "motion editing" allows determination of myocardial inorganic phosphate and pH. *Radiology* 173(P):289, 1989. Presented at RSNA.
223. Schaefer, S., Schwartz, G.S., Gober, J.R., Massie, B., and Weiner, M.W.: Effects of myocardial ischemia on metabolites and contractility. *Radiology* 173(P):289, 1989. Presented at RSNA.
224. Kurhanewicz, J., Thomas, M.A., Jajodia, P., James, T.L., Weiner, M.W., and Narayan, P.: Trans-rectal multinuclear magnetic resonance spectroscopy for the characterization of normal and malignant prostates *in vivo*. *Magnetic Resonance Imaging* 8:65, 1990. Presented at the SMRI Annual Meeting, 1990.
225. Sappey-Marinier, D., Hubesch, B., Deicken, R., Fein, G., Van Dyke, C., and Weiner, M.W.: ^{31}P and ^1H MRS studies of deep white matter lesions. *Magnetic Resonance Imaging* 8:68, 1990. Presented at the SMRI Annual Meeting, 1990.
226. Smekal, A., Silber, S., and Weiner, M.W.: A new stress test device for cardiac NMR. *Magnetic Resonance Imaging* 8:120, 1990. Presented at the SMRI Annual Meeting, 1990.
227. Meyerhoff, D.J., Karczmar, G.S., Venook, A.P., Wilkinson, M., Valone, F., and Weiner, M.W.: Quantitative ^{31}P MRS study of the effectiveness of chemoembolisation on human hepatic cancers. *Magnetic Resonance Imaging* 8:130, 1990. Presented at the SMRI Annual Meeting.
228. Hugg, J.W., Maudsley, A.A., Twieg, D.B., Matson, G.B., Sappey-Marinier, D., Hubesch, B., and Weiner, M.W.: Spectroscopic imaging of ^{31}P in the human brain. *Magnetic Resonance Imaging* 8:165, 1990. Presented at the SMRI Annual Meeting, 1990.
229. Thomas, M.A., Kurhanewicz, J., Jajodia, P., James, T.L., and Weiner, M.W.: Multinuclear transrectal spin-echo MRS of human prostate. Presented at the 31st Experimental Nuclear Magnetic Resonance Spectroscopy Conference, 1990.

Curriculum Vitae - Michael W. Weiner, M.D.

230. Saprey-Marinier, D., Hugg, J., Calabrese, G., Deicken, R., Fein, G., and Weiner, M.W.: Increased lactate in human visual cortex. Presented at the 31st Experimental Nuclear Magnetic Resonance Spectroscopy Conference, 1990.
231. Moussavi, R.S., Carson, P.J., Weiner, M.W., and Miller, R.G.: Fatigue of rapid movements: a model of central fatigue. Abstracts, American Association of Neurology, p.386, 1990.
232. Hugg, J.W., Maudsley, A.A., Twieg, D.B., Matson, G.B., and Weiner, M.W.: Nuclear magnetic resonance spectroscopic imaging of ^{31}P in the human brain. Bulletin of the American Physical Society, 35:499. Presented at the Annual Meeting of the American Physical Society, 1990.
233. Meyerhoff, D.J., Karczmar, G.S., Venook, A.P., Wilkinson, M., Valone, F., and Weiner, M.W.: Hepatic chemoembolisation studied by quantitative phosphorus-31 magnetic resonance spectroscopy. Clinical Research 38:104A, Presented, AFCR Western Meeting, 1990.
234. Smekal, A., Silber, S., and Weiner, M.W.: A new stress test device for cardiac NMR. Clinical Research 38:93A, 1990. Presented AFCR Western Meeting, 1990.
235. Gober, J.R., Matson, G.B., Schwartz, G.S, Schaefer, S., Massie, B., and Weiner, M.W.: An isolation device for simultaneous measurement of coronary blood flow and myocardial segment shortening during ^{31}P nuclear magnetic resonance spectroscopy. Abstract, Society of Magnetic Resonance in Medicine, p.546. Presented at the Eighth Annual Meeting, 1990.
236. Thomas, M.A., Kurhanewicz, J., James, T.L., Narayan, P., and Weiner, M.W.: Transrectal localized ^{31}P MR spectroscopy of human prostate *In vivo*.Abstract, Society of Magnetic Resonance in Medicine, p. 965. Presented at the Eighth Annual Meeting, 1990.
237. Maudsley, A.A., Elliott, M.A., and Weiner, M.W.: Data display and analysis for 4D spectroscopic imaging. Abstract, Society of Magnetic Resonance in Medicine, p.571. Presented at the Eighth Annual Meeting, 1990.
238. Saprey-Marinier, D., Calabrese, G., Hugg, J.W., Deicken, R., Fein, G., and Weiner, M.W.: Increased lactate in human visual cortex during photic stimulation. Abstract, Society of Magnetic Resonance in Medicine, p.106. Presented at the Eighth Annual Meeting, 1990.
239. Schaefer, S., Schwartz, G., Trocha, S.D., Christoph, I., Steinman, S., Garcia, J., Massie, B., and Weiner, M.W.: Dissociation between high energy phosphates and pH during prolonged regional myocardial ischemia *in vivo*. Abstract, Society of Magnetic Resonance in Medicine, p.925. Presented at the Eighth Annual Meeting, 1990.
240. Schaefer, S., Schwartz, G., Steinman, S., Meyerhoff, D.J., Massie, B., and Weiner, M.W.: Metabolic response of the heart to increased work: ^{31}P NMR spectroscopy of normal and cardiomyopathic myocardium in man. Abstract, Society of Magnetic Resonance in Medicine, p. 245. Presented at the Eighth Annual Meeting, 1990.

Curriculum Vitae - Michael W. Weiner, M.D.

241. Schwartz, G., Schaefer, S., Trocha, S.D., Steinman, S., Gober, J.R., Garcia, J., Massie, B., and Weiner, M.W.: Metabolic and functional consequence of blunted myocardial reactive hyperemia. Abstract, Society of Magnetic Resonance in Medicine, p.924. Presented at the Eighth Annual Meeting, 1990.
242. Meyerhoff, D.J., Plesh, O., and Weiner, M.W.: High-energy phosphate metabolism in the human masseter muscle with sustained submaximal exercise monitored by surface coil ^{31}P MRS. Abstract, Society of Magnetic Resonance in Medicine, p.879. Presented at the Eighth Annual Meeting, 1990.
243. Meyerhoff, D.J., Karczmar, G.S., Venook, A.P., Wilkinson, M., Valone, F., and Weiner, M.W.: Effects of chemoembolisation on human hepatic cancers monitored by ^{31}P ISIS spectroscopy. Abstract, Society of Magnetic Resonance in Medicine, p.318. Presented at the Eighth Annual Meeting, 1990.
244. Meyerhoff, D.J., Maudsley, A.A., Twieg, D.B., and Weiner, M.W.: Phosphorus metabolite mapping of human heart, liver, and kidney by surface coil spectroscopic imaging. Abstract, Society of Magnetic Resonance in Medicine, p.140. Presented at the Eighth Annual Meeting, 1990.
245. Hugg, J.W., Matson, G.B., Maudsley, A.A., Twieg, D.B., Hubesch, B., Sappey-Marinier, D., and Weiner, M.W.: ^{31}P spectroscopic imaging of human brain disease. Abstract, Society of Magnetic Resonance in Medicine, p.999. Presented at the Eighth Annual Meeting, 1990.
246. Hugg, J.W., Maudsley, A.A., Weiner, M.W., and Matson, G.B.: Enhanced birdcage coil for ^{31}P spectroscopic imaging of human brains. Abstract, Society of Magnetic Resonance in Medicine, p.528. Presented at the Eighth Annual Meeting, 1990.
247. Hubesch, B., Deicken, R., Sappey-Marinier, D., Weiner, M.W., and Fein, G.: A ^{31}P magnetic resonance spectroscopy study of the effect of diazepam on brain phosphorus metabolism. Abstract, Society of Magnetic Resonance in Medicine, p.995. Presented at the Eighth Annual Meeting, 1990.
248. Fernandez, E.J., Higuchi, T., Shimizu, H., Weinstein, P.R., Weiner, M.W., and Maudsley, A.A.: ^1H spectroscopic imaging studies of rat brain. Abstract, Society of Magnetic Resonance in Medicine, p.1091. Presented at the Eighth Annual Meeting, 1990.
249. Baker, A.J., Kostov, K.G., and Weiner, M.W.: The recovery of muscle force in slowed following long duration exercise: influences of metabolic and nonmetabolic factors on human muscle fatigue. Abstract, Society of Magnetic Resonance in Medicine, p.884. Presented at the Eighth Annual Meeting, 1990.

Curriculum Vitae - Michael W. Weiner, M.D.

250. Baker, A.J., Trocha, S.D., Brandes, R., Miller, R.G., and Weiner, M.W.: Estimation of the energy cost of muscle activation. Abstract, Society of Magnetic Resonance in Medicine, p.867. Presented at the Eighth Annual Meeting, 1990.
251. Hugg, J.W., Matson, G.B., Maudsley, A.A., Twieg, D.B., Sappey-Mariner, D., and Weiner, M.W.: Magnetic resonance spectroscopic imaging in human brains. Proceedings of the Twelfth Annual International Conference of the IEEE/EMBS, November 12(1):65-66, 1990.
252. Schwartz, G.G., Schaefer, S., Trocha, S.D., Garcia, J., Weiner, M.W. and Massie, B.M.: Relation between reactive hyperemia intensity and the recover of myocardial phosphate metabolites and contractility following brief ischemia. Abstract, American Heart Association 63rd Scientific Session, 1990.
253. Deicken, R.F., Hubesch, B., Jensen, P., Sappey-Marinier, D., Fein, G., and Weiner, M.W.: Alterations in brain phosphate metabolite concentrations in patients with HIV infection as measured by magnetic resonance spectroscopy. Abstract, Sixth International Conference on AIDS, San Francisco, CA, 1990.
254. Meyerhoff, D.J., Maudsley, A.A., Twieg, D.B., and Weiner, M.W.: Phosphorus spectroscopic imaging of organs other than the brain. Radiology 177(P):275, 1990. Presented at RSNA.
255. Higuchi, T., Fernandez, E.J., Lara, R., Shimizu, H., Weinstein, P.R., Maudsley, A.A., and Weiner, M.W.: Metabolic mapping of postischemic delayed neuronal damage by proton magnetic resonance spectroscopic imaging. American Heart Association 16th International Joint Conference on Stroke and Cerebral Circulation, 1991. Stroke 22(1):138, 1991.
256. Hugg, J.W., Matson, G.B., Duijn, J.H., Maudsley, A.A., and Weiner, M.W.: MR spectroscopic imaging of stroke. American Heart Association 16th International Joint Conference on Stroke and Cerebral Circulation, 1991. Stroke 22(1):143, 1991.
257. Schaefer, S., Schwartz, G.G., Trocha, S.D., Garcia, J., Weiner, M.W., and Massie, B.M.: High-energy phosphates are not limited by myocardial energy requirements. American College of Cardiology 40th Annual Scientific Session, 1991.
258. Schwartz, G.G., Schaefer, S., Trocha, S.D., Garcia, J., Steinman, S.K., Weiner, M.W., and Massie, B.M.: Effect of supranormal coronary blood flow on myocardial oxygen consumption, contractility and phosphate metabolism in the pig. American College of Cardiology 40th Annual Scientific Session, 1991.
259. Schwartz, G.G., Schaefer, S., Trocha, S.D., Garcia, J., Weiner, M.W., and Massie, B.M.: Relation between reactive hyperemia intensity and the recovery of myocardial phosphate metabolites and contractility following brief ischemia. American College of Cardiology 40th Annual Scientific Session, 1991.

Curriculum Vitae - Michael W. Weiner, M.D.

260. Meyerhoff, D.J., Deicken, R., Calabrese, G., MacKay, S., Sappey-Marinier, D., Fein, G., and Weiner, M.W.: Cerebral phosphorus metabolite concentrations are not altered by sedation with valium. *Journal of Magnetic Resonance Imaging* 1:210, 1991. Presented, SMRI Annual Meeting.
261. Meyerhoff, D.J., Maudsley, A.A., Twieg, D.B., and Weiner, M.W.: Phosphorus spectroscopic imaging with surface coils. *Journal of Magnetic Resonance Imaging* 1:157, 1991. Presented, SMRI Annual Meeting.
262. Duijn, J.H., Maudsley, A.A., Hugg, J.W., and Weiner, M.W.: Proton spectroscopic imaging of stroke in human brain. *Journal of Magnetic Resonance Imaging* 1:119, 1991. Presented, SMRI Annual Meeting.
263. Calabrese, G., Deicken, R.F., Schoenfeld, F., Merrin, E.L., Weiner, M.W., and Fein, G.: Temporal lobe energy phosphate metabolism asymmetry in schizophrenia. Abstract, Third International Congress of Schizophrenia Research, Biological Psychiatry Meeting. 1991.
264. Higuchi, T., Fernandez, E.J., Maudsley, A.A., Weinstein, P.R., and Weiner, M.W.: Study of brain ischemia using *in vivo* ^1H spectroscopic imaging. Presented at the Annual Meeting of the Japan Neurosurgical Society.
265. Christoph, I., Massie, B.M., Minotti, J., Caulfield, M., Garcia, J., and Weiner, M.W.: Muscle fatigue is closely coupled to inorganic phosphate *in vivo*. Presented, Western Section, APCR, Carmel, CA, Clinical Research 39:99A, 1991.
266. Fernandez, E.J., Maudsley, A.A., Higuchi, T., and Weiner, M.W.: ^1H spectroscopic imaging of rat brain at 7 Tesla. Abstract, Proceedings ENC, 1991. Presented at the 32nd Experimental Nuclear Magnetic Resonance Spectroscopy Conference, St. Louis, April 1991.
267. Meyerhoff, D.J., Hugg, J.W., Duijn, J., Matson, G.B., Maudsley, A.A., and Weiner, M.W.: Overview of spectroscopic imaging at the San Francisco VA Medical Center. Society for Magnetic Resonance in Medicine and Biology, Zurich, 1991. p.141.
268. Laxer, K.D., Hugg, J.W., Duijn, J.H., Matson, G.B., Maudsley, A.A., and Weiner, M.W.: ^{31}P MR spectroscopic imaging of temporal lobe seizures. Abstract, American Society of Neuroradiology 29th Annual Meeting, Washington, D.C., 1991. p.36.
269. Hugg, J.W., Duijn, J.H., Matson, G.B., Maudsley, A.A., Tsuruda, J., and Weiner, M.W.: ^{31}P and ^1H spectroscopic imaging of brain infarcts. Abstract, American Society of Neuroradiology 29th Annual Meeting, Washington, D.C., p.40.
270. Cheng, J.C., Sessler, D.I., Soskin, T., Manoglovic, R., Nathan, R.P., and Weiner, M.W.: Amputated limbs are preserved better by hypothermic pulsatile perfusion than by surface cooling: evidence from magnetic resonance spectroscopy. Abstract, American Society for Reconstructive Microsurgery, Seventh Annual Meeting, Orlando, FL.

Curriculum Vitae - Michael W. Weiner, M.D.

271. Schwartz, G.G., Steinmann, S., Garcia, J., Greyson, C., Massie, B., and Weiner, M.W.: *In vivo* ^{31}P spectroscopy of the porcine right ventricle: Response to acute pressure overload. Abstract, Society of Magnetic Resonance in Medicine, p.72. Presented at the Tenth Annual Meeting, 1991.
272. Husted, C.A., Hugg, J.M., de Bie, S.H., Matson, G.B., Maudsley, A.A., and Weiner, M.W.: ^1H and ^{31}P MR spectroscopic imaging (MRSI) of multiple sclerosis. Abstract, Society of Magnetic Resonance in Medicine, p.83. Presented at the Tenth Annual Meeting, 1991.
273. Higuchi, T., Fernandez, E.J., Shimizu, H., Weinstein, P.R., Maudsley, A.A., and Weiner, M.W.: Effect of focal brain ischemia on lactate, N-acetyl aspartate, and glutamate. Abstract, Society of Magnetic Resonance in Medicine, p.145. Presented at the Tenth Annual Meeting, 1991.
274. Maudsley, A.A., Hugg, J.W., Fernandez, E.J., Matson, G.B., and Weiner, M.W.: Application of reduced K-space sampling in spectroscopic imaging. Abstract, Society of Magnetic Resonance in Medicine, p.186. Presented at the Tenth Annual Meeting, 1991.
275. Hugg, J.W., Matson, G.B., Duijn, J.H., Maudsley, A.A., Laxer, K.D., and Weiner, M.W.: ^{31}P MR spectroscopic imaging (MRSI) of focal epilepsy. Abstract, Society of Magnetic Resonance in Medicine, p.223. Presented at the Tenth Annual Meeting, 1991.
276. Duijn, J.H., Hugg, J.W., Matson, G.B., Maudsley, A.A., and Weiner, M.W.: ^1H and ^{31}P spectroscopic imaging of human brain infarction. Abstract, Society of Magnetic Resonance in Medicine, p.225. Presented at the Tenth Annual Meeting, 1991.
277. Meyerhoff, D.J., Duyn, J.H., Bachman, L., Fein, G., and Weiner, M.W.: Alterations of brain proton metabolites in HIV infection: Preliminary ^1H SI findings. Abstract, Society of Magnetic Resonance in Medicine, p.404. Presented at the Tenth Annual Meeting, 1991.
278. Higuchi, T., Fernandez, E.J., Maudsley, A.A., and Weiner, M.W.: Quantitative analysis of metabolites in rat brain using ^1H MR spectroscopic imaging. Abstract, Society of Magnetic Resonance in Medicine, p.436. Presented at the Tenth Annual Meeting, 1991.
279. Fernandez, E.J., Maudsley, A.A., Higuchi, T.T., and Weiner, M.W.: Surface coil three-dimensional ^1H spectroscopic imaging of rat brain. Abstract, Society of Magnetic Resonance in Medicine, p.462. Presented at the Tenth Annual Meeting, 1991.
280. Matson, G.B., Lara, R.S., Hugg, J.W., Maudsley, A.A., Elliott, M., and Weiner, M.W.: Molar quantitation of ^{31}P metabolites in human brain magnetic resonance spectroscopic imaging (MRSI). Abstract, Society of Magnetic Resonance in Medicine, p.465. Presented at the Tenth Annual Meeting, 1991.

Curriculum Vitae - Michael W. Weiner, M.D.

281. Baker, A.J., Levinsohn, D.G., Borowsky, C.D., Gordon, L., and Weiner, M.W.: Amputated limbs are preserved better by hypothermic perfusion than by surface cooling. Abstract, Society of Magnetic Resonance in Medicine, p.539. Presented at the Tenth Annual Meeting, 1991.
282. Schaefer, S., Schwartz, G.G., Steinman, S., Garcia, J., Trocha, S.D., Massie, B.M., and Weiner, M.W.: Metabolic effects of reduced regional contractility: Equilibrium of ATP. Abstract, Society of Magnetic Resonance in Medicine, p.570. Presented at the Tenth Annual Meeting, 1991.
283. Hugg, J.W., Matson, G.B., Husted, C.H., Maudsley, A.A., Laxer, K.D., and Weiner, M.W.: Chronic focal encephalitis studied by ^1H and ^{31}P MR spectroscopic imaging. Abstract, Society of Magnetic Resonance in Medicine Works in Progress, p.979. Presented at the Tenth Annual Meeting, 1991.
284. Duijn, J.H., Matson, G.B., and Weiner, M.W.: 3D phase encoding methods for ^1H spectroscopic imaging of human brain. Abstract, Society of Magnetic Resonance in Medicine Works in Progress, p. 1005. Presented at the Tenth Annual Meeting, 1991.
285. Schwartz, G.G., Steinman, S., Garcia, J., Greyson, C., Weiner, M.W., and Massie, B.: Energetics of acute right ventricular pressure overload. Presented at the American Heart Association 64th Scientific Session, 1991.
286. Schwartz, G.G., Steinman, S., Massie, B., and Weiner, M.W.: In vivo ^{31}P NMR spectroscopy of the right ventricle. Presented at the American Heart Association 64th Scientific Session, 1991.
287. Schaefer, S., Schwartz, G.G., Steinman, S., Garcia, J., Weiner, M.W., and Massie, B.M.: Metabolic effects of reduced contractility induced by regional lidocaine infusion. Abstract, American Heart Association 64th Scientific Session, 1991.
288. Schaefer, S., Schwartz, G.G., Steinman, S., Garcia, J., Wisneski, J.A., Weiner, M.W., and Massie, B.M.: Dissociation of phosphate metabolism and lactate release during prolonged ischemia. Abstract, American Heart Association 64th Scientific Session, 1991.
289. Brandes, R., Figueredo, V.M., Camacho, S.A., and Weiner, M.W.: Ca^{2+} measurements in perfused hearts by fluorescence. Effects of motion, tissue absorbance, and NADH. Presented at the American Heart Association 64th Scientific Session, 1991.
290. Figueredo, V.M., Brandes, R., Massie, B., Weiner, M.W., and Camacho, S.A.: Regulation of contractility during mild reductions in coronary flow in the perfused heart. Presented at the American Heart Association 64th Scientific Session, 1991.
291. Hugg, J.W., Matson, G.B., Duijn, J.H., Maudsley, A.A., Laxer, K.D., and Weiner, M.W.: ^{31}P magnetic resonance spectroscopic imaging (MRSI) of focal epilepsy. Radiology 181(P):113,

Curriculum Vitae - Michael W. Weiner, M.D.

1990. Presented at the 77th Scientific Assembly and Annual Meeting of RSNA, December 1991.
292. Levinsohn D.G., Gordon, L., Borowsky, C.D., Baker, A.J., Cheng, J.C., Zekun, Z., and Weiner, M.W.: A new method of limb preservation. Presented at Ninth Residents and Fellows Conference of the American Society for Surgery of the Hand. Orlando, FL, October 1991.
293. Borowsky, C.D., Levinsohn, D.G., Baker, A.J., Cheng, J.C., Sessler, D.I., Soskin, T., Weiner, M.W., and Gordon, L.: An advance in preservation of amputated limbs: pulsatile perfusion versus surface cooling. Presented at the 55th Annual Meeting of the Western Orthopaedic Association, Tucson, AZ, October 1991.
294. Sappey-Marinier, D., and Weiner, M.W.: Etude des Maladies Cerebrales par Spectroscopie RMN Clinique. Quatrieme congres du GRAMM, Marseille, France, 1991.
295. Sappey-Marinier, D., and Weiner, M.W.: Etude par Spectroscopie RMN H1 et P31 de la Reponse Metabolique du Cortex Visuel chez l'Homme au cours d'une Stimulation Lumineuse. Quatrieme congres du GRAMM, Marseille, France, 1991.
296. Sappey-Marinier, D., Weiner, M.W., and Bonmartin, A.: Etude des Maladies Cerebrales par Spectroscopie RMN Clinique, Societe Francaise de Medecine Nucleaire et de Biophysique, Montpellier, France, 1991.
297. Sappey-Marinier, D., Weiner, M.W., and Bonmartin, A.: Spectroscopie RMN Localisee et Imagerie Spectroscopique de l'Infarctus Cerebral. Cinquieme congres du GRAMM, Bordeaux, France, 1992.
298. Figueredo, V.M., Brandes, R., Weiner, M.W., and Camacho, S.A.: Transmural gradient of free cytosolic calcium during low flow ischemia: An INDO-1 fluorescence study. American College of Cardiology 41st Annual Scientific Session, 1992.
299. Camacho, S.A., Figueredo, V.M., Brandes, R., and Weiner, M.W.: Regulation of left ventricular relaxation by free cytosolic calcium in whole hearts. American College of Cardiology 41st Annual Scientific Session, 1992.
300. Weiner, M.W., Meyerhoff, D.J., Hugg, J.W., Matson, G.B., and Maudsley, A.A.: Spectroscopic imaging of human organs and tumors. Abstract, Advanced Radiation Therapy, p.9, 1991.
301. Hugg, J.W., Laxer, K.D., Matson, G.B., and Weiner, M.W.: Lateralization of human focal epilepsy by ^{31}P and ^1H MR Spectroscopic Imaging. Abstract, Society of Magnetic Resonance in Medicine. Presented at the Tenth Annual Meeting, 1991.

Curriculum Vitae - Michael W. Weiner, M.D.

302. Kent-Braun, J.A., Sharma, K., Massie, B., Oka, R., Weiner, M.W., and Miller, R.G.: Absence of metabolic abnormalities in patients with chronic fatigue syndrome. Abstract, Medical Science Sport Exercise 23(4suppl):S63, 1991.
303. Kent-Braun, J.A., Elliott, M., Steinman, S., Miller, R.G., and Weiner, M.W.: Oxidative potential, metabolic transitions and fatigue in exercising skeletal muscle in humans. American College of Sports Medicine Annual Meeting, 1992.
304. Manoylovic, R., Levinsohn, D.G., Borowsky, C.D., Baker, A.J., Weiner, M.W., and Gordon, L.: Flush surface cooling versus pulsatile hypothermic perfusion for the preservation of amputated limbs. Presented at the Eighth Annual Meeting of the American Society for Reconstructive Microsurgery, 1992.
305. Massie, B.M., Garcia, J., Steinman, S., Wisneski, J.A., Weiner, M.W., Owens, T., and Schwartz, G.G.: Demonstration of pure "demand ischemia" by ^{31}P NMR and isotopically measured lactate release. Presented at the American Heart Association 65th Scientific Session, 1992.
306. Greyson, C., Garcia, J., Steinman, S., Wong, A., Weiner, M.W., Massie, B.M., and Schwartz, G.G.: Effects of inotropic stimulation in right ventricular ischemia. Presented at the American Heart Association 65th Scientific Session, 1992.
307. Schwartz, G.G., Greyson, C., Wisneski, J.A., Weiner, M.W., Massie, B.M., Garcia, J., Steinman, S., and Attaie, A.: Relation between right ventricular oxygen consumption, high energy phosphates, and substrate metabolism. Presented at the American Heart Association 65th Scientific Session, 1992.
308. Kent-Braun, J.A., Sharma, K.R., Weiner, M.W., and Miller, R.G.: Slower phosphocreatine resynthesis rates in multiple sclerosis. Presented at the American Physiological Society, 1992.
309. Massie, B., Schwartz, G.G., Garcia, J., Steinman, S., Weiner, M.W., and Wisneski, J.: Changes in energy phosphates with increased left ventricular workload represent "demand ischemia": Evidence from simultaneous ^{31}P -MRS and ^{14}C lactate dilution studies in pigs. Abstract, Society of Magnetic Resonance in Medicine, p.343. Presented at the Eleventh Annual Meeting, 1992.
310. Schwartz, G.G., Greyson, C., Garcia, J., Steinman, S., Wisneski, J., Massie, B., and Weiner, M.W.: Relation between regional oxygen consumption, high-energy phosphates and substrate metabolism in the porcine right ventricle. Abstract, Society of Magnetic Resonance in Medicine, p.345. Presented at the Eleventh Annual Meeting, 1992.
311. Higuchi, T., Fernandez, E.J., Rooney, W.D., Gaspari, H.L., Graham, S.H., Weinstein, P.R., Maudsley, A.A., and Weiner, M.W.: Regional specific changes of N-acetyl aspartate, lactate, alanine, and glutamate in post globally ischemic brain. Abstract, Society of Magnetic Resonance in Medicine, p.547. Presented at the Eleventh Annual Meeting, 1992.

Curriculum Vitae - Michael W. Weiner, M.D.

312. Husted, C.A., Juijn, J.H., Goodkin, D.S., Fein, G., Dickinson, M., Maudsley, A.A., and Weiner, M.W.: Normal appearing white matter changes in multiple sclerosis detected by porton and phosphorous MR spectroscopic imaging. Abstract, Society of Magnetic Resonance in Medicine, p.1912. Presented at the Eleventh Annual Meeting, 1992.
313. Hugg, J.W., Laxer, K.D., Matson, G.B., Maudsley, A.A., and Weiner, M.W.: ^1H MR spectroscopic imaging detects neuron loss more sensitively than MRI in focal epilepsy. Abstract, Society of Magnetic Resonance in Medicine, p.1913. Presented at the Eleventh Annual Meeting, 1992.
314. Hugg, J.W., Laxer, K.D., Matson, G.B., Maudsley, A.A., and Weiner, M.W.: Quantitative ^{31}P MR spectroscopic imaging lateralizes focal epilepsy. Abstract, Society of Magnetic Resonance in Medicine, p.1923. Presented at the Eleventh Annual Meeting, 1992.
315. Meyerhoff, D.J., MacKay, S., Grossman, N., Van Dyke, C., Dillon, W., Fein, G., and Weiner, M.W.: Effects of normal aging and Alzheimer's disease on cerebral ^1H metabolites. Abstract, Society of Magnetic Resonance in Medicine, p.1931. Presented at the Eleventh Annual Meeting, 1992.
316. Meyerhoff, D.J., MacKay, S., Sappey-Marinier, D., Deicken, R., Bachmann, L., Biggins, C., Dillon, W., Fein, G., and Weiner, M.W.: Effects of chronic alcohol abuse on cerebral phosphorous metabolites in HIV-negative and HIV-positive individuals. Abstract, Society of Magnetic Resonance in Medicine, p.1938. Presented at the Eleventh Annual Meeting, 1992.
317. Meyerhoff, D.J., MacKay, S., Bachman, L., Poole, N., Dillon, W., Fein, G., and Weiner, M.W.: Reduced neuronal marker (N-acetylaspartate) in HIV-infection. Abstract, Society of Magnetic Resonance in Medicine, p.1939. Presented at the Eleventh Annual Meeting, 1992.
318. MacKay, S., Meyerhoff, D.J., Presti, D., Fein, G., and Weiner, M.W.: Alteration of brain phospholipids associated with chronic cocaine abuse. Abstract, Society of Magnetic Resonance in Medicine, p.1940. Presented at the Eleventh Annual Meeting, 1992.
319. Greyson, C., Garcia, J., Steinman, S., Massie, B., Weiner, M.W., and Schwartz, G.G.: Effects of inotropic stimulation in right ventricular ischemia. Abstract, Society of Magnetic Resonance in Medicine, p.2311. Presented at the Eleventh Annual Meeting, 1992.
320. Baker, A.J., Levinsohn, D.G., Manoylovic, R., Gordon, L., and Weiner, M.W.: Muscle bioenergetic status in amputated limbs is better preserved by limb perfusion than by flush-surface cooling. Abstract, Society of Magnetic Resonance in Medicine, p.2741. Presented at the Eleventh Annual Meeting, 1992.
321. Juijn, J.H., Husted, C.A., Matson, G.B., Maudsley, A.A., and Weiner, M.W.: Molar quantitation of *in vivo* proton metabolites in human brain with 3D MR spectroscopic imaging.

Curriculum Vitae - Michael W. Weiner, M.D.

Abstract, Society of Magnetic Resonance in Medicine, p.3807. Presented at the Eleventh Annual Meeting, 1992.

322. Schwartz, G.G., Twieg, D.B., Steinman, S., Elliott, M., and Weiner, M.W.: Comparison of triangulation, NMR1, and VARPRO algorithms in the analysis of ^{31}P spectra from the *in situ* porcine heart. Abstract, Society of Magnetic Resonance in Medicine, p.3811. Presented at the Eleventh Annual Meeting, 1992.
323. Hugg, J.W., Maudsley, A.A., Weiner, M.W., and Matson, G.B.: Reduced voxel size and contamination in ^{31}P MR spectroscopic imaging. Abstract, Society of Magnetic Resonance in Medicine, p.3813. Presented at the Eleventh Annual Meeting, 1992.
324. Hugg, J.W., Laxer, K.D., Matson, G.B., and Weiner, M.W.: Lateralization of human focal epilepsy by ^{31}P and ^1H MR Spectroscopic Imaging. Presented at the 78th Scientific Assembly and Annual Meeting of RSNA, 1992.
325. Camacho, S.A., Figueredo, V.M., Brandes, R., and Weiner, M.W.: Effect of low flow ischemia on free cytosolic calcium and the calcium-pressure relationship. Circulation 86 (Suppl II), 1992.
326. Weiner, M.W. and Lenkinski, R.: Clinical MR spectroscopy and spectroscopic imaging ("How-to" Workshop). Radiology 185(P):45, 1992. Presented at RSNA.
327. Meyerhoff, D.J., MacKay, S.R., Dillon, W.P., Fein, G., and Weiner, M.W.: Effects of chronic and active alcohol abuse on cerebral phosphorus metabolites. Radiology 185(P):124, 1992. Presented at RSNA.
328. Higuchi, T., Fernandez, E.J., Graham, S.H., Weinstein, P.R., Maudsley, A.A., and Weiner, M.W.: *In vivo* metabolite mapping in experimental cerebral ischemia with ^1H MR spectroscopy: Spatial distribution of energy failure and early detection of neuronal damage. Radiology 185(P):172, 1992. Presented at RSNA.
329. Hugg, J.W., Laxer, K.D., Matson, G.B., Maudsley, A.A., and Weiner, M.W.: Lateralization of human focal epilepsy at phosphorus and proton MR spectroscopy. Radiology 185(P):200, 1992. Presented at RSNA.
330. Massie, B.M., Schwartz, G.C., Garcia, J., Steinman, S., Wisneski, J., Weiner, M.W., and Owens, T.: Myocardial metabolic responses to high workload: Is there evidence for demand ischemia? Presented at the American College of Cardiology 42nd Annual Scientific Session, 1993.
331. Constans, J.M., Meyerhoff, D.J., Norman, D., Fein, G., and Weiner, M.W.: ^1H and ^{31}P magnetic resonance spectroscopic imaging of deep white matter lesions. Presented at the Society of Magnetic Resonance Imaging Eleventh Annual Meeting, 1993.

Curriculum Vitae - Michael W. Weiner, M.D.

332. Meyerhoff, D.J., MacKay, S., Grossman, N., Norman, D., Fein, G., and Weiner, M.W.: Increased choline in Alzheimer's disease supports theory of membrane defect. Presented at the Society of Magnetic Resonance Imaging Eleventh Annual Meeting, 1993.
333. Meyerhoff, D.J., MacKay, S., Dillon, W., Fein, G., and Weiner, M.W.: Neuron loss in HIV-infection with cognitive impairment suggested by ^1H magnetic resonance spectroscopic imaging. Presented at the Society of Magnetic Resonance Imaging Eleventh Annual Meeting, 1993.
334. Baker, A.J., Brandes, R., and Weiner, M.W.: Intracellular acidosis in skeletal muscle slows relaxation of force and calcium signals and decreases calcium sensitivity. Abstract, Biophysical Society Meeting, 1993.
335. Brandes, R., Figueiredo, V.M., Camacho, S.A., Baker, A.B., and Weiner, M.W.: Quantitation of $[\text{Ca}^{2+}]_i$ during hypoxia in perfused rat hearts using indo-1 fluorometry. Abstract, Biophysical Society Meeting, 1993.
336. Husted, C.A., Goodkin, D.S., Maudsley, A.A., Tsuruda, J.S., and Weiner, M.W.: Biochemical alterations in multiple sclerosis lesion and normal white matter detected in brain by *in vivo* ^{31}P and ^1H magnetic resonance spectroscopic imaging. American Academy of Neurology Annual Meeting, 1993.
337. Miller, R.G., Sharma, K., Mynhier, M., Weiner, M.W., and Kent-Braun, J.A.: Evidence of an abnormal intramuscular component of fatigue in multiple sclerosis. American Academy of Neurology Annual Meeting, 1993.
338. Garcia, P., Van der Grond, J., Hugg, J.W., Weiner, M.W., Matson, G.B., and Laxer, K.D.: Evaluation of local cerebral metabolism using ^{31}P magnetic resonance spectroscopic imaging in patients with frontal lobe epilepsy. American Academy of Neurology Annual Meeting, 1993.
339. Meyerhoff, D.J., MacKay, S., Dillon, W.P., Weiner, M.W., and Fein, G.: *In vivo* evidence of neuron loss in Hiv-infected brains. American Academy of Neurology Annual Meeting, 1993.
340. Sharma, K.R., Kent-Braun, J.A., Majundar, S., Mynhier, M., Weiner, M.W., and Miller, R.G.: Pathophysiology of fatigue in amyotrophic lateral sclerosis. Presented at the American Academy of Neurology Annual Meeting, 1993.
341. Kent-Braun, J.A., Sharma, K.R., Weiner, M.W., and Miller, R.G.: Altered muscle function during progressive exercise in persons with multiple sclerosis. Presented at the American College of Sports Medicine Annual Meeting, 1993.
342. Miller, R.G., Sharman, K.R., Mynhier, M., Weiner, M.W., and Kent-Braun, J.A.: Evidence of abnormal intramuscular component of fatigue in multiple sclerosis. Presented at the American Academy of Neurology Annual Meeting, 1993.

Curriculum Vitae - Michael W. Weiner, M.D.

343. Wu, Z., Maudsley, A.A., and Weiner, M.W.: Fully automatic processing of *in vivo* proton spectra and spectroscopy images, p.1520. Presented at the IEEE Medical Imaging Conference, 1993.
344. Van der Grond, J., Laxer, K.D., Gerson, J.R., Hugg, J.W., Matson, G.B., and Weiner, M.W.: Regional distribution of ^{31}P metabolic changes in temporal lobe epilepsy. Abstract, Society of Magnetic Resonance in Medicine, p.432. Presented at the Twelfth Annual Meeting, 1993.
345. Maudsley, A.A., Wu, Z., and Weiner, M.W.: Automatic processing of MR spectroscopic images. Abstract, Society of Magnetic Resonance in Medicine, p.510. Presented at the Twelfth Annual Meeting, 1993.
346. Ebisu, T., Rooney, W.D., Graham, S.H., Wu, Z., Weiner, M.W., and Maudsley, A.A.: N-acetyl aspartate as a marker of neuronal viability in kainate-induced status epileptics studied by ^1H magnetic resonance spectroscopic imaging. Abstract, Society of Magnetic Resonance in Medicine, p.513. Presented at the Twelfth Annual Meeting, 1993.
347. Rooney, W.D., Ebisu, T., Mancuso, T., Weiner, M.W., and Maudsley, A.A.: Comparison of water and ^1H metabolite relaxation and diffusion in cytotoxic edema. Abstract, Society of Magnetic Resonance in Medicine, p.1492. Presented at the Twelfth Annual Meeting, 1993.
348. Massie, B.M., Schaefer, S., McKirnan, M.D., White, F., Schwartz, G.G., Weiner, M.W., and Wisneski, J.A. Swine with moderate LVH do not manifest greater susceptibility to ischemia with increased work. Presented at the American Heart Association 66th Scientific Session, 1993.
349. Wu, Z., Maudsley, A.A., and Weiner, M.W.: Fully automatic processing of *in vivo* proton spectra and spectroscopic images. Proceedings of IEEE Medical Imaging Conference, 1993.
350. Baker, A.J., Brandes, R., and Weiner, M.W.: Effect of acidosis on force and $[\text{Ca}^{2+}]$ in skeletal muscle. Abstract, Biophysical Society Meeting, 1994.
351. Baker, A.J., Brandes, R., Schreuer, J., Camacho, S.A., and Weiner, M.W.: Intracellular protein and acidosis alter the K_d and fluorescence spectra of the calcium indicator indo-1. Abstract, Biophysical Society Meeting, 1994.
352. Meyerhoff, D.J., MacKay, S., Weiner, M.W., and Fein, G.: Reduced phospholipid resonances in chronic alcoholics. Presented at the Research Society on Alcoholism Meeting, 1994.
353. Meyerhoff, D.J., MacKay, S., Weiner, M.W., and Fein, G.: Effects of chronic alcohol consumption and HIV infection on brain phospholipid metabolites. Presented at the Research Society on Alcoholism Meeting, 1994.

Curriculum Vitae - Michael W. Weiner, M.D.

354. Laxer, K.D., Ende, G., Garcia, P., Hawkins, R., and Weiner, M.W.: High resolution PET in mesial temporal lobe epilepsy: An evaluation of patients without hippocampal abnormalities on MRI. American Academy of Neurology Annual Meeting, 1994.
355. Laxer, K.D., Van der Grond, J., Hugg, J., Matson, G., Gerson, J., and Weiner, M.W.: The relationship of partial epilepsy severity to neuronal loss as determined by proton magnetic resonance spectroscopic imaging (^1H MRSI). American Academy of Neurology Annual Meeting, 1994.
356. Schreur, J.H.M., Halow, J.M., Figueredo, V.M., Weiner, M.W., and Camacho, S.A.: $[\text{Ca}^{2+}]_i$ and contractility during control and ischemia: Effects of felodipine, a Ca^{2+} channel blocker, not caused by Ca^{2+} channel blockade. Presented at the American Heart Association 67th Scientific Session, 1994.
357. Chang, K.C., Schreur, J.H.M., Weiner, M.W., Kariya, K., Simpson, P.C., and Camacho, S.A.: $[\text{Ca}^{2+}]_c$ transient decline is related to sarcoplasmic reticulum Ca^{2+} -ATPase protein concentration of isolated myocytes in pressure-overload hypertrophy. Presented at the American Heart Association 67th Scientific Session, 1994.
358. Shames, D.M., Baker, A.J., Schreur, J.H.M., Weiner, M.W., and Camacho, S.A.: The calcium-pressure relationship in the isolated perfused rat heart: A mathematical model for parameter estimation. Presented at the American Heart Association 67th Scientific Session, 1994.
359. Weiner, M.W.: Clinical applications of MR spectroscopy and spectroscopic imaging. Abstract, Society of Magnetic Resonance, p.185. Presented at the Second Annual Meeting, 1994.
360. Meyerhoff, D.J., Poole, N., Weiner, M.W., and Fein, G.: Are proton metabolites affected in brain areas of heaviest HIV load? Abstract, Society of Magnetic Resonance, p.580. Presented at the Second Annual Meeting, 1994.
361. MacKay, S., Meyerhoff, D.J., Constans, J.M., Fein, G., and Weiner, M.W.: Effects of subcortical ischemic vascular dementia on cerebral ^1H metabolites. Abstract, Society of Magnetic Resonance, p.597. Presented at the Second Annual Meeting, 1994.
362. Meyerhoff, D.J., and Weiner, M.W.: Metabolite variations and age effects in the normal human brain studied by ^1H MRSI. Abstract, Society of Magnetic Resonance, p.598. Presented at the Second Annual Meeting, 1994.
363. Mancuso, A., Karibe, H., Rooney, W.D., Zarow, G.J., States, B., Graham, S.H., Weiner, M.W., and Weinstein, P.R.: Early reductions in apparent diffusion coefficient of water underestimate the extent of pathologic cerebral blood flow reduction during MCA occlusion in rats. Abstract, Society of Magnetic Resonance, p.1013. Presented at the Second Annual Meeting, 1994.

Curriculum Vitae - Michael W. Weiner, M.D.

364. Schuff, N., Ehrhardt, J.C., and Weiner, M.W.: Efficient data acquisition for 2D spectroscopic imaging using hexagonal k-space sampling. Abstract, Society of Magnetic Resonance, p.1177. Presented at the Second Annual Meeting, 1994.
365. Kent-Braun, J.A., Sharma, K.R., Weiner, M.W., and Miller, R.G.: Localizing the source of muscle fatigue in clinical populations. Society of Magnetic Resonance Workshop, Liverpool, 1994.
366. Rooney, W.D., Goodkin, D.E., Schuff, N., Norman, D., and Weiner, M.W.: Cr is increased and MTI is unchanged in multiple sclerosis normal appearing white matter. Abstract, Society of Magnetic Resonance, p.55. Presented at the Third Annual Meeting, 1995.
367. Ende, G., Laxer, K.D., Knowlton, R., Matson, G.B., Schuff, N., and Weiner, M.W.: Water referenced quantitative 2D ^1H SI in the hippocampus of healthy controls and TLE patients. Abstract, Society of Magnetic Resonance, p.1962. Presented at the Third Annual Meeting, 1995.
368. Haupt, C.I., Schuff, N., Weiner, M.W., and Maudsley, A.A.: Reduction of lipid truncation artifacts in ^1H MR spectroscopic imaging. Abstract, Society of Magnetic Resonance, p.1914. Presented at the Third Annual Meeting, 1995.
369. Ende, G., Laxer, K.D., Knowlton, R., Tanabe, J., Matson, G.B., and Weiner, M.W.: T_2 in the hippocampus of TLE patients: No changes are detected in the absence of hippocampal atrophy. Abstract, Society of Magnetic Resonance, p.1230. Presented at the Third Annual Meeting, 1995.
370. Ende, G., Laxer, K.D., Knowlton, R., Tanabe, J., Matson, G.B., and Weiner, M.W.: Quantitative ^1H SI shows bilateral metabolite changes in unilateral TLE patients with and without hippocampal atrophy. Abstract, Society of Magnetic Resonance, p.155. Presented at the Third Annual Meeting, 1995.
371. Meyerhoff, D.J., MacKay, S., Ezekiel, F., Di Sclafani, V., Gerson, J., Constans, J.M., Norman, D., Fein, G., and Weiner, M.W.: Metabolite changes in Alzheimer's disease are not due to atrophy: Combined ^1H MRSI and MRI segmentation. Abstract, Society of Magnetic Resonance, p.388. Presented at the Third Annual Meeting, 1995.
372. Meyerhoff, D.J., Rooney, W.D., Tokumitsu, T., and Weiner, M.W.: Cerebral ethanol exhibits magnetization transfer effects. Abstract, Society of Magnetic Resonance, p.272. Presented at the Third Annual Meeting, 1995.
373. Figueiredo, V.M., Zhou, H.Z., Baker, A.J., Weiner, M.W., and Camacho, S.A.: Faster isovolumic relaxation in rat hearts chronically exposed to ethanol. Presented at the American Heart Association 68th Scientific Session, 1995.
374. Chang, K.C., Figueiredo, V.M., Weiner, M.W., and Camacho, S.A.: Thyroid hormone reverses the slowing of isovolumic relaxation and cytosolic Ca^{2+} decline induced by pressure-overload

Curriculum Vitae - Michael W. Weiner, M.D.

- hypertrophy in rat hearts. Presented at the American Heart Association 68th Scientific Session, 1995.
375. Kent-Braun, J.A., Walker, C.H., Weiner, M.W., and Miller, R.G.: Upper and lower motor neuron function and muscle weakness in ALS. American Academy of Neurology Annual Meeting, 1996. Published in Neurology, 46:A470, 1996.
376. Rooney, W.D., Goodkin, D.E., Abundo, M., and Weiner, M.W.: The spatial dependence of magnetization transfer ratio to MS plaque: A new measure of microscopic disease burden. American Academy of Neurology Annual Meeting, 1996.
377. Meyerhoff, D.J., Rooney, W.D., Tokumitsu, T., and Weiner, M.W.: Evidence of multiple ethanol pools in the brain: An in-vivo proton magnetization transfer study. Abstract, p.201. Presented at the 37th Experimental Nuclear Magnetic Resonance Conference, 1996.
378. Laxer, K.D., Ende, G., Walker, J.A., Knowlton, R., Matson, G.B., and Weiner, M.W.: NAA as a measure of hippocampal function in temporal lobe epilepsy. Abstract, International Society for Magnetic Resonance in Medicine, p.136. Presented at the Fourth Scientific Meeting, 1996.
379. Ende, G., Knowlton, R., Laxer, K.D., Matson, G.B., and Weiner, M.W.: NAA is a more sensitive marker of hippocampal disease than atrophy: Evidence that NAA is a neuronal marker. Abstract, International Society for Magnetic Resonance in Medicine, p.137. Presented at the Fourth Scientific Meeting, 1996.
380. Vermathen, P., Ende, G., Laxer, K.D., Knowlton, R., El Din, M., Matson, G.B., and Weiner, M.W.: Hippocampal NAA is not reduced in neocortical epilepsy: Contrast with medial temporal lobe epilepsy. Abstract, International Society for Magnetic Resonance in Medicine, pg. 138. Presented at the Fourth Scientific Meeting, 1996.
381. Schuff, N., Knowlton, R., Amend, D.L., Meyerhoff, D.J., Tanabe, J.L., Fein, G., and Weiner, M.W.: Changes of NAA in Alzheimer's disease are more prominent in hippocampus than in cortical gray matter: An ^1H MR spectroscopic imaging study. Abstract, International Society for Magnetic Resonance in Medicine, p.308. Presented at the Fourth Scientific Meeting, 1996.
382. Vermathen, P., Ende, G., Laxer, K.D., Knowlton, R., El Din, M., Matson, G.B., and Weiner, M.W.: ^1H -MRSI follow-up studies on epilepsy show strongly altered metabolite concentrations after surgery. Abstract, International Society for Magnetic Resonance in Medicine, p.957. Presented at the Fourth Scientific Meeting, 1996.
383. Knowlton, R., Ende, G., Laxer, K.D., Hawkins, R.A., Vermathen, P., Matson, G.B., and Weiner, M.W.: FDG-PET, ^1H MRSI, hippocampal volumetry, and T2 maps in the evaluation of non-lesional temporal lobe epilepsy. Abstract, International Society for Magnetic Resonance in Medicine, p.958. Presented at the Fourth Scientific Meeting, 1996.

Curriculum Vitae - Michael W. Weiner, M.D.

384. Ebisu, T., Rooney, W.D., Graham, S.H., Mancuso, A., Weiner, M.W., and Maudsley, A.A.: Early detection of excitotoxic brain damage by MR spectroscopic imaging and diffusion-weighted MRI. Abstract, International Society for Magnetic Resonance in Medicine, p.916. Presented at the Fourth Scientific Meeting, 1996.
385. Tokumitsu, T., Mancuso, A., Weinstein, P.R., Weiner, M.W., and Maudsley, A.A.: Time course study of temporal lobe epilepsy in the rat by diffusion-weighted MRI and ^1H spectroscopic imaging. Abstract, International Society for Magnetic Resonance in Medicine, p.922. Presented at the Fourth Scientific Meeting, 1996.
386. Meyerhoff, D.J., Bloomer, C., DeVivo, K., Norman, D., Fein, G., and Weiner, M.W.: Metabolic effects of HIV infection in periventricular and other brain regions. Abstract, International Society for Magnetic Resonance in Medicine, p.935. Presented at the Fourth Scientific Meeting, 1996.
387. Meyerhoff, D.J., Fein, G., and Weiner, M.W.: Elevated scyllo-inositol in adult human brain? Abstract, International Society for Magnetic Resonance in Medicine, p.954. Presented at the Fourth Scientific Meeting, 1996.
388. Schuff, N., and Weiner, M.W.: Investigation of metabolite changes in cortex and neocortex of healthy elderly by multislice ^1H MR spectroscopic imaging. Abstract, International Society for Magnetic Resonance in Medicine, p. 213. Presented at the Fourth Scientific Meeting, 1996.
389. Matson, G.B., Hugg, J.W., Schuff, N., Maudsley, A.A., and Weiner, M.W.: Improvement of k-space acquisition strategies for ^{31}P MRSI and ^1H MRSI. Abstract, International Society for Magnetic Resonance in Medicine, p.1217. Presented at the Fourth Scientific Meeting, 1996.
390. Mancuso, A., Nimura, T., Weiner, M.W., and Weinstein, P.R.: Thresholds of water ADC reduction associated with neuronal injury following middle cerebral artery occlusion in rats. Abstract, International Society for Magnetic Resonance in Medicine, p.1334. Presented at the Fourth Scientific Meeting, 1996.
391. Marks, W.J., Laxer, K.D., Vermathen, P., Matson, G.B., and Weiner, M.W.: Brain pH in primary generalized epilepsy determined by ^{31}P magnetic resonance spectroscopic imaging. American Epilepsy Society Meeting, 1996.
392. Meyerhoff, D.J., Rooney, W.D., Tokumitsu, T., and Weiner, M.W.: Evidence of multiple ethanol pools in the brain: An in-vivo proton magnetization transfer study. Presented at the 1996 Joint Scientific Meeting of the Research Society on Alcoholism and the International Society for Biomedical Research on Alcoholism, 1996.
393. Miyamae, M., Camacho, S.A., Diamond, I., Weiner, M.W., and Figueredo, V.M.: Chronic ethanol use attenuates ischemia - reperfusion injury in guinea pig hearts via adenosine A1

Curriculum Vitae - Michael W. Weiner, M.D.

receptors. Presented at the 1996 Joint Scientific Meeting of the Research Society on Alcoholism and the International Society for Biomedical Research on Alcoholism, 1996.

394. Marks, W.J. Jr., Laxer, K.D., Vermathen, P., Matson, G.B., and Weiner, M.W.: Brain pH in Primary generalized epilepsy determined by 31P magnetic resonance spectroscopic imaging. *Epilepsia* 37 (Suppl. 5): 196, 1996. Presented at the 1996 Annual Meeting of the American Epilepsy Society, San Francisco.
395. Ende, G., Laxer, K.D., Knowlton, R., Vermathen, P., Matson, G., and Weiner M.W.: What is the Impact of 1H MRSI on the Presurgical Evaluation of Intractable Temporal Lobe Epilepsy? *Magnetic Resonance Materials in Physics, Biology, and Medicine (MAG*MA)*, Supplement to Volume IV Number II June 1996, ESMRMB '96, Prague, p.139, No.253.
396. Vermathen, P., Laxer, K.D., El Din, M., Matson, G.B., and Weiner, M.W.: ¹H MRSI of the hippocampus shows strong anterior-posterior differences in epilepsy patients and in controls. Abstract, International Society for Magnetic Resonance in Medicine, p.36. Presented at the Fifth Scientific Meeting, 1997.
397. Tanabe, J., Miller, R., Vermathen, M., Gelinas, D., Weiner, M.W., and Rooney, W.D.: Reduced MTR and normal T2 in amyotrophic lateral sclerosis. Abstract, International Society for Magnetic Resonance in Medicine, p.78. Presented at the Fifth Scientific Meeting, 1997.
398. Meyerhoff, D.J., Bloomer, C., Neilson-Bohlman, L., Norman, D., Fein, G., and Weiner, M.W.: The regional pattern of brain white matter NAA reductions in HIV infection is associated with the severity of cognitive impairment. Abstract, International Society for Magnetic Resonance in Medicine, p.292. Presented at the Fifth Scientific Meeting, 1997.
399. Vermathen, P., Laxer, K.D., El Din, M., Matson, G.B., and Weiner, M.W.: Hippocampal NAA loss in mesial temporal lobe epilepsy is not accompanied by changes in other brain regions. A combined multislice and PRESS MRSI study. Abstract, International Society for Magnetic Resonance in Medicine, p.1185. Presented at the Fifth Scientific Meeting, 1997.
400. Rooney, W.D., Miller, R., Gelinas, D., Schuff, N., Maudsley, A., and Weiner, M.W.: Multislice ¹H MRSI of amyotrophic lateral sclerosis. Abstract, International Society for Magnetic Resonance in Medicine, p.1189. Presented at the Fifth Scientific Meeting, 1997.
401. Schuff, N., Amend, D., El Din, M., Norman, D., Fein, G., and Weiner, M.W.: Reduced hippocampal NAA and volume in elderly with mild cognitive impairments. Abstract, International Society for Magnetic Resonance in Medicine, p.1207. Presented at the Fifth Scientific Meeting, 1997.
402. Schuff, N., Amend, D., Marmar, C.R., Weiss, D.S., Neyland, T.C., Schoenfeld, F., Fein, G., and Weiner, M.W.: Changes of hippocampal NAA and volume in post traumatic stress disorder. Abstract, International Society for Magnetic Resonance in Medicine, p.1231. Presented at the Fifth Scientific Meeting, 1997.

Curriculum Vitae - Michael W. Weiner, M.D.

403. Govindaraju, V., Meyerhoff, D.J., Maudsley, A.A., Vermathen, M., and Weiner, M.W.: Factors affecting ethanol signal visibility in brain membrane preparations of control and alcohol-fed rats. Abstract, International Society for Magnetic Resonance in Medicine, p.1252. Presented at the Fifth Scientific Meeting, 1997.
404. Meyerhoff, D.J., Weiner, M.W., and Fein, G.: Midbrain neuronal damage in heavy drinkers: An in vivo proton magnetic resonance study. Presented at the Research Society on Alcoholism Meeting, 1997.
405. Govindaraju, V., Meyerhoff, D.J., Maudsley, A.A., Vermathen, M., and Weiner, M.W.: Effects of brain membranes on ^1H nuclear magnetic resonance signal intensity of ethanol in vitro. Presented at the Research Society on Alcoholism Meeting, 1997.
406. Weiner, M.W.: Clinical applications of magnetic resonance spectroscopic imaging. Presented at the Advances in Magnetic Resonance Imaging Second International Magnetom Vision Conference, Rotterdam, The Netherlands. 1997.
407. Govindaraju, V., Kiefer, A.P., Matson, G.B., Schuff, N., Weiner, M.W., and Maudsley, AA.: Multiple echo ^1H spectroscopy imaging of human brain. Presented at the Advances in Magnetic Resonance Imaging Second International Magnetom Vision Conference, Rotterdam, The Netherlands. 1997.
408. Meyerhoff, D.J., Fein, G., and Weiner, M.W.: Cerebral metabolic effects of HIV infection studies by ^1H MRSI. Presented at the Advances in Magnetic Resonance Imaging Second International Magnetom Vision Conference, Rotterdam, The Netherlands. 1997.
409. Vermathen, P., Laxer, K.D., El Din, M. Matson, G.B., and Weiner, M.W.: ^1H MRSI of the hippocampus in epilepsy patients and in controls. Presented at the Advances in Magnetic Resonance Imaging Second International Magnetom Vision Conference, Rotterdam, The Netherlands. 1997.
410. Schuff, N., Soher, B.J., Young, K., Maudsley, A.A., Ezekiel, F., Amend, D.L., Fein, G., and Weiner, M.W.: Regression and histogram analysis of ^1H MR spectroscopic imaging data. Abstract, International Society for Magnetic Resonance in Medicine, p.28. Presented at the Sixth Scientific Meeting, 1998.
411. Schuff, N., Amend, D.L., Capizzano, A., Soher, B.J., Young, K., Maudsley, A.A., Ezekiel, F., Fein, G., and Weiner, M.W.: NAA reductions in parietal and frontal cortex of Alzheimer's disease. Abstract, International Society for Magnetic Resonance in Medicine, p.729. Presented at the Sixth Scientific Meeting, 1998.
412. Schuff, N., Amend, D.L., Rooney, W.D., Gelinas, D.F., Miller, R., Soher, B.J., Young, K., Maudsley, A.A., Fein, G., and Weiner, M.W.: Quantitative assessment of NAA reductions in the motor cortex of amyotrophic lateral sclerosis. Abstract, International Society for Magnetic Resonance in Medicine, p.734. Presented at the Sixth Scientific Meeting, 1998.

Curriculum Vitae - Michael W. Weiner, M.D.

413. Meyerhoff, D.J., Bloomer, C., Salas, G., Schuff, N., Norman, D., Weiner, M.W., and Fein, G.: Cortical metabolite alterations in recently abstinent cocaine and cocaine/alcohol dependent subjects. Abstract, International Society for Magnetic Resonance in Medicine, p.1715. Presented at the Sixth Scientific Meeting, 1998.
414. Vermathen, P., Laxer, K.D., Schuff, N., Maudsley, A.A., Matson, G.B., and Weiner, M.W.: Reduced NAA localizes the seizure focus in neocortical epilepsy a multislice MR spectroscopic imaging study. Abstract, International Society for Magnetic Resonance in Medicine, p.1728. Presented at the Sixth Scientific Meeting, 1998.
415. Vermathen, P., Laxer, K.D., Schuff, N., Maudsley, A.A., Matson, G.B., and Weiner, M.W.: Simultaneous detection of reduced NAA in hippocampal and other brain regions in mesial temporal lobe epilepsy using multislice proton MRSI. Abstract, International Society for Magnetic Resonance in Medicine, p.1729. Presented at the Sixth Scientific Meeting, 1998.
416. Amend, D.L., Schuff, N., Fein, G., and Weiner, M.W.: Combined use of quantitative MRI segmentation and hippocampal voluming in Alzheimer's disease and mild cognitive impairment. Abstract, International Society for Magnetic Resonance in Medicine, p.2159. Presented at the Sixth Scientific Meeting, 1998.
417. Rooney, W., Sloan, R., Vermathen, M., Bacchetti, P., Gee, L., Andersson, P.B., Waubant, E., Stewart, T., Chan, A., Hietpas, J., and Weiner, M.W.: AAN Scientific Program Abstract Submission, Abstract, American Association of Neurology. Presented at Meeting 1998.
418. Suhy, J., Rooney, W.D., Goodkin, D.E., Maudsley, A.A., and Weiner, M.W.: Biochemical comparison of primary progressive and relapsing remitting multiple sclerosis by proton magnetic resonance spectroscopy. Abstract 34th ACS Western Regional Meeting, Presented at Meeting, 1998.
419. Goodkin, D.E., Rooney, W., Sloan, R., Vermathen, M., Bacchetti, P., Gee, L., Andersson, PB. Waubant, E., Stewart, T., Chan, A., Hietpas, J., and Weiner, M.W.: PD, T1, Gadolinium (Gd+) Intensities, T2 and MTRs are chronically diffusely abnormal in MS brain and on monthly MRI scans are related to the appearance of new Gd+ lesions in normal appearing white matter (NAWM). Abstract, American Academy of Neurology Scientific Proram, 1998.
420. Waubant, E., Sloan, R., Vermathen, M., Rooney, W., Weiner, M.W., and Goodkin D.: A pilot study of the effect of weekly intramuscular (IM) 6.0 MIU interferon beta-1a on monthly gadolinium-enhanced brain MRI activity in patients with relapsing multiple sclerosis. J Neurology 245:185, 1998.
421. O'Neill, J., Schuff, N., Soto, G., Ezekiel, F., Eberling, J.L., Klein, G.J., Jagust, W.J. and Weiner, M.W.: Method to correlate NAA and CMRglu from coregistered 1 H MRSI and 18FDG-PET data. Abstract, International Society for Magnetic Resonance in Medicine, p.27. Presented at the Seventh Scientific Meeting, 1999.

Curriculum Vitae - Michael W. Weiner, M.D.

422. Schuff, N., Rooney, W.D., Gelinas, D.F., Miller, R.G., Amend, D., Maudsley, A.A., and Weiner, M.W.: Abnormal levels of Cho but not of NAA in the posterior internal capsule of patients with ALS. Abstract, International Society for Magnetic Resonance in Medicine, p.49. Presented at the Seventh Scientific Meeting, 1999.
423. Tanabe, J.L., Ezekiel, F., Jagust, W.J., Reed, B.R., Norman, D., Schuff, N., Weiner, M.W., and Fein, G.: Magnetization transfer ratio of white matter hyperintensities in subcortical ischemic vascular dementia. Abstract, International Society for Magnetic Resonance in Medicine, p.65. Presented at the Seventh Scientific Meeting, 1999.
424. Capizzano, A.A., Vermathen, P., Laxer, K., Ende, G., Norman, D., Matson, G.B., Maudsley, A.A. and Weiner, M.W.: Qualitative reading of 1H MRS images in the presurgical evaluation of temporal lobe epilepsy patients. Abstract, International Society for Magnetic Resonance in Medicine, p.143. Presented at the Seventh Scientific Meeting, 1999.
425. Suhy, J., Schuff, N., Miller, R.G., Gatto, N., Maudsley, A.A., and Weiner M.W.: Quantitation of measurement error for motor cortex NAA in ALS. Abstract, International Society for Magnetic Resonance in Medicine, p.143. Presented at the Seventh Scientific Meeting, 1999.
426. Schuff, N., Capizzano, A.A., Amend, D., Gamst, A., Jagust, W., Fein, G., Maudsley, A.A., and Weiner, M.W.: Regional pattern of diminished levels of cortical NAA in alzheimer's disease and vascular dementia. Abstract, International Society for Magnetic Resonance in Medicine, p.144. Presented at the Seventh Scientific Meeting, 1999.
427. Capizzano, A.A., Schuff, N.W., Amend, D.L., Tanabe, J.L., Norman, D., Maudsley, A.A., Jagust, W., Chui, H., Fein, G. and Weiner, M.W.: Decreased cortical NAA in subcortical ischemic vascular dementia. Abstract, International Society for Magnetic Resonance in Medicine, p.145. Presented at the Seventh Scientific Meeting, 1999.
428. Vermathen, M., Rooney, W.D., Goodkin, D.E., and Weiner M.W.: Creatine and *myo*-inositol are increased in multiple sclerosis normal appearing white matter. Abstract, International Society for Magnetic Resonance in Medicine, p.145. Presented at the Seventh Scientific Meeting, 1999.
429. Suhy, J., Rooney, W.D., Goodkin, D.E., Capizzano, A.A., Maudsley, A.A., and Weiner, M.W.: Comparison of primary progressive and relapsing remitting multiple sclerosis by 1H MRSI. Abstract, International Society for Magnetic Resonance in Medicine, p.158. Presented at the Seventh Scientific Meeting, 1999.
430. Chui, H., DiSclafani, V., Weiner, M.W., Norman, D., Jagust, W., Ellis, W., Vinters, H., and Fein, G.: Subcortical ischemic lesions in dementia are associated with hippocampal and cortical atrophy. Abstract, Presented at the AAN Scientific Program, Neurology 52: A98, 1999.
431. Chui, H., Zarow, C., Ellis, W., Amend, D., Weiner, M., Jagust, W., Mungas, D., Reed, B., Kramer, J., Lyness, S., and Vinters, H. Diagnosis of Ischemic Vascular Dementia (IVD):

Curriculum Vitae - Michael W. Weiner, M.D.

Clinical-Pathological Correlations. Abstract, International Conference on Vascular Dementia, Geneva, Switzerland, p. 27, 1999.

432. Schuff, N., Amend, D., Capizzano, A., Chui, H., Jagust, W., Norman D., and Weiner, M.W. Cerebral metabolite abnormalities in subcortical ischemic vascular dementia and Alzheimer's disease detected with proton magnetic resonance spectroscopic imaging. Presented at the 1st International Congress on Vascular Dementia, Geneva, Switzerland, October 3-6, 1999.
433. Amend, D.L., Chui, H.C., Norman, D., Jagust, W., Fein, G., and Weiner, M.W. Subcortical ischemic lesions in dementia are associated with cortical and hippocampal atrophy. Abstract, International Conference on Vascular Dementia, Geneva, Switzerland, 1999.
434. Reed, B.R., Eberling, J.L., Mungas, D.M., Weiner, M.W., Kramer, J.H. Chui, H.C., and Jagust, W.J.: Prefrontal hypometabolism may predict decline in patients with lacunar stroke. International Neuropsychological Society, Vol. 6(2), pg. 155. 28th Annual Meeting, Denver, Colorado, 2000.
435. Suhy, J., Schuff, N., Miller, R.G., Gatto, N., Maudsley, A.A., Weiner, M.W.: 1H MRSI Measurement of Early Detection and Longitudinal Changes in ALS. Proceedings of the International Society for Magnetic Resonance in Medicine, pg. 630, 8th Scientific Meeting and Exhibition, Denver, Colorado, 2000.
436. Suhy, J., Schuff, N., Maudsley, A.A., Weiner, M.W., and Miller, R.G.: Detection of ALS by Proton Magnetic Resonance Imaging. Presented at the American Academy of Neurology 52nd Annual meeting, San Diego, CA, 2000. Neurology 54(6) Suppl 2, pg. 51.
437. Mungas, D.N., Reed, B.R., Jagust, W.J., Kramer, J.H., Weiner, M.W., Mack, W.J. and Chui, H.C.: Differential Decline in Memory and Executive Functioning in Patients With and Without Subcortical Infarcts. American Academy of Neurology, 52nd Annual meeting, San Diego, CA, 2000.
438. Du, A.T., Schuff, N., Amend, D., Hsu, Y.Y., Laakso, M.P., Yaffe, K. Weiner, M.W.: Volumes of Entorhinal Cortex and Hippocampus in Mild Cognitive Impairment and Alzheimer's Disease. Proceedings of the International Society for Magnetic Resonance in Medicine, pg. 290, 8th Scientific Meeting and Exhibition, Denver, Colorado, 2000.
439. Schuff, N., Du, A.T., Greenfield, T., Amend, D., Norman, D., Chui, H., Weiner, M.W.: Hippocampal NAA Differences Despite Similar Atrophy Between Subcortical Ischemic Vascular Demensia and Alzheimer's Disease. Proceedings of the International Society for Magnetic Resonance in Medicine, pg. 294, 8th Scientific Meeting and Exhibition, Denver, Colorado, 2000.
440. Gatenby, J.C., Rooney, W.D., Gelinas, D., Miller, R.G., Weiner, M.W.: Brain Activation During a Motor Task in Amyotrophic Lateral Sclerosis. Proceedings of the International Society for Magnetic Resonance in Medicine, pg. 322, 8th Scientific Meeting and Exhibition, Denver, Colorado, 2000.

Curriculum Vitae - Michael W. Weiner, M.D.

441. Weidermann, D., Schuff, N., Matson, G., Maudsley, A.A., Weiner, M.W.: Test-retest Reliability of Short TE Multislice ^1H -MRSI. Proceedings of the International Society for Magnetic Resonance in Medicine, pg. 369, 8th Scientific Meeting and Exhibition, Denver, Colorado, 2000.
442. Schuff, N., Ezekiel, F., Du, A.T., Weiner, M.W.: Automated Voxel Selection and Assessment of Partial Volume Effects in ^1H MRSI Studies of Hippocampus. Proceedings of the International Society for Magnetic Resonance in Medicine, pg. 425, 8th Scientific Meeting and Exhibition, Denver, Colorado, 2000.
443. O'Neill, J., Marks, W.J., Schuff, N., Feiwel, R., Weiner, M.W.: Short-TE ^1H MRS of the Substantia Nigra and Quantitative MRI in Idiopathic Parkinson's Disease. Proceedings of the International Society for Magnetic Resonance in Medicine, pg. 1161, 8th Scientific Meeting and Exhibition, Denver, Colorado, 2000.
444. Hsu, Y.Y., Schuff, N., Amend, D., Du, A.T., Norman, D., Chui, H., Jagust, W.J., Weiner, M.W.: Quantitative MRI Differences Between Alzheimer's Disease Without and With Lacunar Infarcts. Proceedings of the International Society for Magnetic Resonance in Medicine, pg. 1262, 8th Scientific Meeting and Exhibition, Denver, Colorado, 2000.
445. Studholme, C., Cardenas-Nicolson, V., Schuff, N., and Weiner, M.W.: High resolution free form deformation analysis of atrophy from longitudinal MRI studies of mild cognitive impairment. In Proceedings of Human Brain Mapping, 2001.
446. Suhy, J, Laxer, KD, Capizzano, AA, Vermathen, P, Matson, GB, Barbaro, NM, Weiner, MW. ^1H MRSI Predicts Surgical Outcome in Temporal Lobe Epilepsy Patients with Normal MRI. Proceedings of ISMRM, Glasgow, Scotland, April, 2001.
447. Suhy, J, Laxer, K, Flenniken, D, Axelrad, J, Capizzano, AA, Weiner, MW. Frontal Lobe NAA Reductions in Temporal Lobe Epilepsy by ^1H MRSI. Proceedings of ISMRM, Glasgow, Scotland, April, 2001.
448. Suhy, J, Miller, RG, Schuff, N, Lopez, R, Maudsley, AA, Weiner, MW. Longitudinal Corticospinal Tract Changes in ALS by ^1H MRSI. Proceedings of ISMRM, Glasgow, Scotland, April, 2001.
449. Weiner, MW, Cardenas, VA, Du, A, Hardin, D, Ezekiel, F, Weber, P. Quantifying Longitudinal Change in Dementia: A Comparison of Methods. American Academy of Neurology 53rd Annual Meeting, Philadelphia, PA, 2001, Neurology 56(8) Suppl 3 pg. A372.
450. Mungas, D, Reed, BR, Jagust, WJ, DeCarli, C, Kramer, JH, Weiner, WM, Schuff, N, Chui, HC. Quantitative MRI Predictors of Cognitive Decline Associated with AD and Cerebrovascular Disease. American Academy of Neurology 53rd Annual Meeting, Philadelphia, PA, 2001, Neurology 56(8) Suppl 3 pg. A374.

Curriculum Vitae - Michael W. Weiner, M.D.

451. Geschwind, M.D., Rosen, H.J., Kramer, J., Mychack, P. Miller, B.L. Dementia in PSP – Subcortical or Frontal? Presented at the 53rd annual meeting of the American Academy of Neurology, Philadelphia, PA, 2001.
452. Gorno-Tempini, M., Rosen, H., Weiner, M., Cappa, S., Miller, B. Common and differing patterns of brain atrophy associated with frontotemporal and semantic dementia. Society for Neuroscience Abstracts, 2001.
453. Geschwind, M.D., Boxer, A., Kramer, J., Rosen, H., Miller, B., Weiner, M. Comparison of cognitive profile and brain atrophy in PSP and CBD. Presented at the First International Symposium on Mental and Behavioral Dysfunction in Movement Disorders, Montreal, Canada, October, 2001. Movement Disorders, 16(1):Suppl 176 pg. S56, 2001.
454. Chui, H.C., Jagust, W.J., Weiner, M.W., Ellis, W., Zarow, C., Reed, B.R., Mungas, D.M., Kramer, J.H., Mack, W., DeCarli, C., Vinters, H. Clinical Imaging Pathological Correlations in Subcortical Ischemic Vascular Dementia. June, 2001. Submitted to Second International Congress on Vascular Dementia.
455. Weiner, M.W., Schuff, N., Du, A.T., Amend, D.L., Jagust, W.J., Reed, B.R., Chui, H. Association between Cortical Impairment and Subcortical Infarctions Assessed Using MR Imaging and Spectroscopic Imaging. Proceedings of Second International Congress on Vascular Dementia, October 4-7, 2001.
456. Studholme, C., Cardenas, V., Schuff, N., Weiner, M. High Resolution Free Form Deformation Analysis of Atrophy from Longitudinal MRI Studies of Mild Cognitive Impairment. NeuroImag, 13(6): S260, 2001.
457. Studholme, C., Cardenas, V., Weiner, M.W. Multi Scale Image and Multi Scale Deformation of Brain Anatomy for Building Average Brain Atlases. Proceedings of SPIE Medical Imaging, SPIE Press Vol 4322-60, pg: 557-68, February, 2001.
458. Studholme, C. Cardenas-Nicolson, V.A., Weiner, M. Building Whole Brain Maps of Atrophy Rate from Multi-Subject Longitudinal Studies Using Free Form Deformations. Proceedings of ISMRM, Glasgow, Scotland, April, 2001.
459. Levine, A., Bruce, A., Rothlind, J., Quigley, L., Weiner, M. Cognitive deficits in Asymptomatic HIV+ individuals? An old question revisited using a novel computerized assessment. Poster presented at the Annual Meeting of the National Academy of Neuropsychology, San Francisco, November, 2001.
460. Studholme, C., Cardenas, V., Schuff, N., Rosen, H., Miller, B., and Weiner, M.: Detecting spatially consistent structural differences in Alzheimer's and Fronto Temporal Dementia using deformation morphometry. In Proceedings of 4th International Conference on Medical Imaging Computing and Computer Assisted Interventions, pg. 41-8, 2001.

Curriculum Vitae - Michael W. Weiner, M.D.

461. Schuff, N., Du, A-T., Amend, D.L., Jagust, W.J., Reed, B.R., Chui, H.C., Weiner, M.W.: Association Between Cortical Impairment and Subcortical Infarction Assessed Using MRI and 1H MRSI. Presented at the 2nd International Congress on Vascular Dementia, Salzburg, Austria, January 24-27, 2002. Ed. Korczyn, A.D., Monduzzi Editore, Bologna, pg. 109-115, 2002.
462. Mungas, D, Jagust, WJ, DeCarli, C, Reed, BR, Harvery, DJ, Mack, WJ, Kramer, JH, Weiner, MW, Chui, HC. MRI Differentially Predicts Decline of Memory and Executive Function in Non-demented Patients with and without Cerebrovascular Disease. Presented at The 54th Annual Meeting of the American Academy of Neurology, Denver, April, 2002.
463. Weiner, MW, Du, AT, Studholme, C, Cardenas-Nicolson, V, Schuff, N, Miller, B, Kramer, JH, Jagust, W, Reed, BR, Chui, HC. Longitudinal Changes of Brain Structures in Healthy Aging and AD. Presented at The 54th Annual Meeting of the American Academy of Neurology, Denver, April, 2002.
464. Studholme, C., Cardenas, V., Schuff, N., Krishnan, M., Chui, and Weiner, M.W.: The effects of cerebrovascular and Alzheimer disease on patterns of ventricular expansion rate derived from serial MRI. In Proceedings of ISMRM, Hawaii, 2002.
465. Rule, RR, Studholme, C, Miller, RG, Weiner, MW (2002) High-Resolution MRI Morphometry Maps Longitudinal Atrophy in ALS Brains. 32nd Annual Meeting of the Society for Neuroscience. 719.7, 2002.
466. Cardenas, V.A., Meyerhoff, D.J., Chao, L.L., Rothlind, J.C., Studholme, C., Rogers, L.J., Lampiris, H., Chesney, M., and Weiner, M.W.: Persistent Brain Injury in HIV Patients on ART. In Abstracts 10th Conference on Retroviruses and Opportunistic Infections, Boston, MA, February 10-14, 2003.
467. Du, A-T., Schuff, N., Kramer, J.H., Studholme, C., Cardenas-Nicolson, V., Norman, D., Reed, B., Miller, B.L., Rosen, H., Yaffe, K., Jagust, W.J., Kmiecik, J., Chui, H., and Weiner, M.W.: Effects of Subcortical Vascular Disease on Cerebral Atrophy and Blood Flow Reduction in Dementia. In 55th Annual Meeting of the American Academy of Neurology, Honolulu, HI, March 29 – April 5, 2003.
468. Mungas, D., Reed, B.R., Jagust, W.J., DeCarli, C., Harvey, D.J., Beckett, L., Kramer, J.H., Weiner, M.W., Mack, W., Zarnow, C., Ellis, W., Vinters, H., and Chui, H.C.: MRI Analogs of Alzheimer's and Cerebrovascular Neuropathology. In 55th Annual Meeting of the American Academy of Neurology, Honolulu, HI, March 29 – April 5, 2003.
469. Meyerhoff, D.J., Cardenas, V., Studholme, C., Blumenfeld, R., Truran, D., Ezekiel, F., Lampiris, H., Rothlind, J., Lindgren, J., and Weiner, M.W.: Evidence for Brain Damage in Treated HIV-Infected Individuals. In 55th Annual Meeting of the American Academy of Neurology, Honolulu, HI, March 29 – April 5, 2003.

Curriculum Vitae - Michael W. Weiner, M.D.

470. Rankin, K.P., Gorno-Tempini, M.L., Weiner, M.W., and Miller, B.L.: Neuroanatomy of Impaired Empathy in Frontotemporal Dementia. In 55th Annual Meeting of the American Academy of Neurology, Honolulu, HI, March 29 – April 5, 2003.
471. Jahng, G.H., Zhu, X.P., Du, A.T., Studholme, C., Matson, G.B., Weiner, M.W., Schuff, N.: Reliability of Brain Perfusion with Pulsed Arterial Spin Labeling. Page 2219. Proceedings of the 11th Meeting of ISMRM, Toronto, Canada, May 10-16, 2003.
472. Kaiser, L.G., Schuff, N., Cashdollar, N., Weiner, M.W.: Short Echo 1H MRS at 4T of Motor Pathways in Human Brain. Proceedings of the 11th Meeting of ISMRM, Toronto, Canada, May 10-16, 2003.
473. Du, A.T., Schuff, N., Jagust, W.J., Miller, B.L., Reed, B.R., Kramer, J.H., Chui, H.C., Weiner, M.W.: Subcortical Vascular Disease Results in Cortical Atrophy Independent of Alzheimer's Disease. Proceedings of the Third International Congress on Vascular Dementia, Prague, Czech Republic, October 23-26, 2003.
474. Schuff, N., Matsumoto, S., Kmiecik, J.A., Studholme, C., Du, A-T., Miller, B.L., Kramer, J.H., Jagust, W.J., Chui, H.C., Ezekiel, F., Weiner, M.W.: Comparison of Cerebral Perfusion in AD and Ischemic Vascular Dementia Using Arterial Spin Labeled MRI. Subcortical Vascular Disease Results in Cortical Atrophy Independent of Alzheimer's Disease. Proceedings of the Third International Congress on Vascular Dementia, Prague, Czech Republic, October 23-26, 2003.
475. Weiner, M.W.: Imaging the Treatment and Early Detection of Alzheimer's Disease. Proceedings from the 3rd Annual Meeting of the International College of Geriatric Psychoneuropharmacology, San Juan, Puerto Rico, December 12-14, 2003.
476. Weiner, M.W., Meyerhoff, D.J., Cardenas-Nicolson, V.C., Kornak, J., Studholme, C., Truran, D., Rothlind, J., Chao, L., Lampiris, H., Grant, R., Lindgren, J.: Progressive White Matter Loss Suggests Ongoing Brain Injury in ART-treated HIV Patients. Abstract 33LB, 11th Conference on Retroviruses and Opportunistic Infections, San Francisco, CA, February 8-11, 2004.
477. Chao, L., Schuff, N., Sacrey, D., Chui, H., Miller, B., Jagust, W., Weiner, M.: Medical Temporal and Parietal N-acetylaspartate Reduction in Elderly Adults Mild Cognitive Impairment. Abstract 27P41, 2nd Scientific Conference "Restauracion Neurologica," Havana, CUBA, February 24-27, 2004.
478. Johnson, N., Jahng, G-H., Zhu, X-P., Li, K-L., Miller, B.L., Chui, H.C., Jagust, W.J., Weiner, M.W., Schuff, N.: Cerebral Hypoperfusion in Alzheimer's Disease and Mild Cognitive Impairment and Age-Related Prolongation of Perfusion Transit Times by Arterial Spin Labeled MRI. Proceedings from the ISMRM Workshop, Venice, Italy, March 21-23, 2004.

Curriculum Vitae - Michael W. Weiner, M.D.

479. Jahng, G-H., Song, E., Zhu, X-P., Matson, G.B., Weiner, M.W., Schuff, N.: Quantitative Comparisons of Pulsed Arterial Spin Labeling Methods for Perfusion Measurements in Human Brain. Proceedings from the ISMRM Workshop, Venice, Italy, March 21-23, 2004.
480. Schuff, N., Jahng, G.H., Zhu, X., Li, K-L., Weiner, M.W.: Age-Related Changes in Kinetics of Brain Perfusion Measured by Pulsed ASL MRI. Page 1396, Proceedings from the 12th ISMRM Scientific Meeting, Kyoto, Japan, May 15-21, 2004.
481. Schuff, N., Chao, L.L., Kramer, J.H., Reed, B.R., Du, A.T., Jagust, W.J., Chui, H.C., Miller, B.L., Weiner, M.W.: Selective Reduction of NAA in Medial Temporal Lobe in Mild Cognitive Impairment. Page 524, Proceedings from the 12th ISMRM Scientific Meeting, Kyoto, Japan, May 15-21, 2004.
482. Meyerhoff, D.J., Ezekiel, F., Schuff, N., Kmiecik, J., Studholme, C., Weiner, M.W.: Lower Absolute CBF in Heavy Drinkers and Compensatory Blood Flow Changes in Treated HIV+ Heavy Drinkers. Page 1346, Proceedings from the 12th ISMRM Scientific Meeting, Kyoto, Japan, May 15-21, 2004.
483. Singh, M., Sim, S., Weiner, M.W., Chui, H: Quantification of Fronto-Occipital and Thalamo-Frontal Connectivity in Alzheimer's Disease by DTI-Tractography. Page 1257, Proceedings from the 12th ISMRM Scientific Meeting, Kyoto, Japan, May 15-21, 2004.
484. Meyerhoff, D.J., Truran, D., Flenniken, D., Song, E., Studholme, C., Weiner, M.W.: Longitudinal Multi-Slice Short-TE 1H MRSI Reveals Ongoing Brain Metabolite Injury in Treated HIV+ Patients and in Chronic Heavy Drinkers. Page 290, Proceedings from the 12th ISMRM Scientific Meeting, Kyoto, Japan, May 15-21, 2004.
485. Jahng, G.H., Weiner, M.W., Schuff, N.: Local Susceptibility Effects on Diffusion Tensor Mapping In Human Brain. American Association of Physicist in Medicine, Pittsburgh, PA, July 2004.
486. Jahng, G.H., Weiner, M.W., Schuff, N.: Optimization of Spin Lattice Relaxation Mapping Based on Two Points Inversion Recovery. American Association of Physicist in Medicine, Pittsburgh, PA, July 2004.
487. Zhu, X.P., Schuff, N., Young, K., Soher, B., Miller, B.L., Jagust, W.J., Weiner, M.W.: Regional Specificity of Brain Metabolite Changes in AD. P2-209, Proceedings from the 9th International Conference on Alzheimer's Disease and Related Disorders, Philadelphia, PA, July 17-22, 2004.
488. Studholme, C., Yaffe, K., Cardenas, V., Schuff, N., Miller, B., Weiner, M.: Using Deformation Morphometry to Investigate Tissue Loss in Dementia With Lewy Bodies. P3-398, Proceedings from the 9th International Conference on Alzheimer's Disease and Related Disorders, Philadelphia, PA, July 17-22, 2004.

Curriculum Vitae - Michael W. Weiner, M.D.

489. Johnson, N.A., Jahng, G-H., Weiner, M.W., Chui, H.C., Miller, B., Jagust, W.J., Schuff, N.: Patterns of Cerebral Hypoperfusion in Alzheimer's Disease and Mild Cognitive Impairment Measured with Arterial Spin Labeled MRI. P2-167, Poster from the 9th International Conference on Alzheimer's Disease and Related Disorders, Philadelphia, PA, July 17-22, 2004.
490. Schuff, N., Jahng, G-H., Zhu, X., Li, K-L., Weiner, M.W.: Age-Related Changes of Brain Perfusion by Arterial Spin Labeled MRI. P2-168, Poster from the 9th International Conference on Alzheimer's Disease and Related Disorders, Philadelphia, PA, July 17-22, 2004.
491. Du, A., Schuff, N., Chao, L.L., Jagust, W.J., Kramer, J.H., Miller, B.L., Reed, B.R., Norman, D., Chui, H.C., Weiner, M.W.: Effects of Age, Cerebrovascular Disease and APOE-e4 on Entorhinal and Hippocampal Atrophy Rates. P2-198, Poster from the 9th International Conference on Alzheimer's Disease and Related Disorders, Philadelphia, PA, July 17-22, 2004.
492. Chao, L.L., Schuff, N., Jagust, W.J., Reed, B.R., Chui, H.C., Miller, B.L., Kramer, J.H., Du, A., Weiner, M.W.: Selective Reduction of Medial Temporal Lobe NAA in Cognitively Impaired but Nondemented Elderly Subjects. P2-213, Poster from the 9th International Conference on Alzheimer's Disease and Related Disorders, Philadelphia, PA, July 17-22, 2004.
493. Du, A., Schuff, N., Chao, L.L., Jagust, W.J., Kramer, J.H., Reed, B.R., Miller, B.L., Chui, H.C., Weiner, M.W.: Predicting Cognitive Decline with Baseline Hippocampal Volume and Rate of Hippocampal Atrophy, Poster from the 9th International Conference on Alzheimer's Disease and Related Disorders, Philadelphia, PA, July 17-22, 2004.
494. Du AT, Schuff N, Meyerhoff DJ, Studholme C, Truran D, Cashdollar N, Hardin D, Weiner MW: Effects of aging and disease on MRI and MRS measurements of white matter, Syllabus from Workshop on Aging Connections: MRI of Age-Related White Matter Changes in the Brain, Boston, MA, October 21-23, 2004...
495. Weiner MW, Thal L, Jack C, Jagust W, Toga A, Beckett L, Peterson R: Alzheimer's disease neuroimaging initiative, Alzheimer's Disease and Parkinson's Diseases: Insights, Progress and Perspectives 7th International Conference, Sorrento, Italy March 9-13, 2005.
496. Schuff N, Du AT, Miller B, Johnson N, Kramer J, Rosen H, Jahng GH, Hayasaka S, Weiner MW.: Different Regional Pattern of Hypoperfusion Between AD and FTD by Arterial Spin Labeling MR, Alzheimer's Disease and Parkinson's Diseases: Insights, Progress and Perspectives 7th International Conference, Sorrento, Italy March 9-13, 2005.
497. Jahng GH, Stables L, Muller SG, Weiner, MW, Meyerhoff DJ, Schad LR, Schuff, N.: Analysis of the Local Susceptibility Effects in Diffusion Tensor Imaging (DTI) on Alzheimer's disease. Proc. Intl. Soc. Mag. Reson. Med. 13th Scientific Meeting, Page 1387, Miami, FL, May 7-13, 2005.

Curriculum Vitae - Michael W. Weiner, M.D.

498. Du AT, Jahng, GH, Miller BL, Hayasaka S, Rosen R, Kramer JH, Weiner MW, Schuff N.: Different Patterns of Hypoperfusion in Frontotemporal Dementia and Alzheimer's Disease by Arterial Spin Labeling MRI. Proc. Intl. Soc. Mag. Reson. Med. 13th Scientific Meeting, Page 74, Miami, FL, May 7-13, 2005.
499. Hayasaka S, Schuff N, Kornak J, Studholme C, Cardenas V, Du AT, Duarte A, Jahng GH, Weiner M.: Identifying Regional Patterns of Concordance and Dissociation between Gray Matter Loss and Hypoperfusion among Alzheimer's Disease Patients. Proc. Intl. Soc. Mag. Reson. Med. 13th Scientific Meeting, Page 1177, Miami, FL, May 7-13, 2005.
500. Kaiser LG, Young K, Soher BJ, Weiner MW.: Macromolecular and Lipid Contributions in Short Echo Time 1H MRS at 4 Tesla: 1) Reliability in Normal Controls and 2) Comparative Study Between Amyotrophic Lateral Sclerosis Patients and Controls. Page: 142 Proc. Intl. Soc. Mag. Reson. Med. 13 Miami, FL, May 7-13, 2005.
501. Zhu X, Young K, Soher BJ, Yin H, Ezekiel F, Weiner MW, Schuff N.: New Spectral Analysis of Short Echotime Multislice 1H MRSI in Human Brain using Eigen Spectra, Baseline Correction and Frequency Alignment. Page 55 Proc. Intl. Soc. Mag. Reson. Med. 13 Miami, FL, May 7-13, 2005.
502. Schuff N, Du AT, Jahng GH, Stables L, Mueller SG, Cashdollar N, Weiner MW.: Regional Decline of Brain Perfusion in Healthy Aging Detected with Arterial Spin Labeling at 4T. Proc. Intl. Soc. Mag. Reson. Med. 13th Scientific Meeting, Page 1165, Miami, FL, May 7-13, 2005.
503. Jahng, GH, Stables L, Ebel A, Matson G, Weiner MW, Meyerhoff DJ, Schuff N.: Sensitive and Fast T₁ Mapping Based on Two Inversion Recovery Magnetic Resonance Images Acquired in a Single Scan. Proc. Intl. Soc. Mag. Reson. Med. 13th Scientific Meeting, Page 2193, Miami, FL, May 7-13, 2005.
504. Ebel A, Maudsley AA, Weiner MW, Schuff N.: Spectral bandwidth considerations for high field volumetric proton echo-planar spectroscopic imaging. Proc. Intl. Soc. Mag. Reson. Med. 13th Scientific Meeting, Page 2514, Miami, FL, May 7-13, 2005.
505. Schuff N, Du AT, Mueller SG, Jahng GH, Stables L, Ebel A, Miller BL, Chui HC, Weiner MW.: 4 Tesla MRI for detecting effects of cerebrovascular disease. Poster from 2nd Congress of the International Society for Vascular Behavioural and Cognitive Disorders, Florence, Italy, June 8-12, 2005.
506. Posner HB, Abu-Shakra S, Shaikh S, Weiner MW, DeCarli C.: Subjects with vascular dementia show different distributions of medial temporal atrophy on MRI as compared to subjects with Alzheimer's disease. Poster from 2nd Congress of the International Society for Vascular Behavioural and Cognitive Disorders, Florence, Italy, June 8-12, 2005.

Curriculum Vitae - Michael W. Weiner, M.D.

507. Weiner MW, Thal L, Petersen R, Jagust W, Trojanowski J, Toga A, Beckett L, Jack C.: Alzheimer's disease neuroimaging initiative. Poster from 2nd Congress of the International Society for Vascular Behavioural and Cognitive Disorders, Florence, Italy, June 8-12, 2005.
508. Chui HC, Zarow C, Mack W, Ellis W, Zheng L, Jagust W, Mungas D, Reed B, Kramer J, DeCarli C, Weiner M, Vinters H. Relative contributions of subcortial cerebrovascular disease, hippocampal sclerosis, and Alzheimer's disease to cognitive impairment. Poster from 2nd Congress of the International Society for Vascular Behavioural and Cognitive Disorders, Florence, Italy, June 8-12, 2005.
509. Amici S, Reed BR, Mungas D, Weiner M, Wetzel M, Johnson J, Goro-Tempini ML, Miller B, Kramer JH.: Mild cognitive impairment with and without lacunes. 2nd Congress of the International Society for Vascular Behavioural and Cognitive Disorders, Florence, Italy, June 8-12, 2005.
510. Duarte A, Hayasaka S, Du AT, Kramer J, Jahng GH, Schuff N, Miller B, Weiner M.: Frontal hypoperfusion correlates with episodic memory deficits in mild cognitive impairment. Poster from Alzheimer's Association 9th International Conference on Prevention of Dementia: Early Diagnosis and Intervention, Washington D.C., June 18-21, 2005.
511. Chao L, Schuff N, Studholme C, Rosen HJ, Gorno-Tempini ML, Kramer JH, Rankin KP, Miller BL, Weiner MW. Patterns of gray and white matter atrophy in the frontal and temporal lobes in FTD, SD and AD patients. Poster from Alzheimer's Association 9th International Conference on Prevention of Dementia: Early Diagnosis and Intervention, Washington D.C., June 18-21, 2005.
512. Mueller SG, Du AT, Stables L, Schuff N, Truran D, Cashdollar N, Weiner MW.: Measurements of hippocampal subfields and age related changes with high resolution MRI at 4Tesla. Poster from Alzheimer's Association 9th International Conference on Prevention of Dementia: Early Diagnosis and Intervention, Washington D.C., June 18-21, 2005.
513. Schuff N, Du AT, Jahng GH, Mueller SG, Stables L, Cashdollar N, Weiner MW.: Regional Decline of brain perfusion in healthy aging detected with arterial spin labeling at 4T. Alzheimer's Association 9th International Conference on Prevention of Dementia: Early Diagnosis and Intervention, Washington D.C., June 18-21, 2005.
514. Du AT, Jahng GH, Miller BL, Hayasaka S, Rosen H, Kramer JH, Weiner MW, Schuff N.: Different patterns of hypoperfusion in frontotemporal dementia and Alzheimer's disease by arterial spin labeling MRI. Alzheimer's Association 9th International Conference on Prevention of Dementia: Early Diagnosis and Intervention, Washington D.C., June 18-21, 2005.
515. Zhang Y, Schuff N, Jahng G-H, et al. Selective degradation of white matter ultrastructure in parahippocampal and posterior cingulate in mild cognitive Impairment and Alzheimer's disease by diffusion tensor imaging. In: Alzheimer's Association "International Conference on Prevention and Dementia; 2005 June 18-21, 2005; Washington D.C.; 2005.

Curriculum Vitae - Michael W. Weiner, M.D.

516. Matthews BR, Rankin K, Castelli F, Glenn S, Stanley C, Gorno-Tempini ML, Weiner M, Miller B.: Recognizing others intentions from their movements: neuroanatomic correlates in neurodegenerative disease. AAN 2006.
517. Du AT, Schuff N, Rosen H, Kramer JH, Miller BL, Weiner MW.: Cortical thinning in Alzheimer's disease and frontotemporal dementia assessed using MRI. AAN 2006
518. Rabinovici GD, Allison SC, Gorno-Tempini ML, Seeley WM, Weiner MW, Johnson JK, Pavlic D, Trojanowski JQ, DeArmond SJ, Miller BL, Rosen HJ.: Voxel-based morphometry in autopsy-proven frontotemporal lobar degeneration and Alzheimer's disease. AAN 2006
519. Chui HC, Zheng L, Weiner MW, Vinters HV, Mack WJ, Ellis WG, Kramer JH, Mungas DM, Reed BR, Jagust WJ, Zarow C.: Differential vulnerability of the right hippocampus in hippocampal sclerosis. AAN 2006.
520. Schuff, Norbert; Stables, Lara; Thayyullathil, Hemanth; Weiner, Michael W. Edge-Guided Localized Phase Unwrapping: Application to SWI. Proc. Intl. Soc. Magn. Med 14th Scientific Meeting, 2006, p. 2942, Seattle, WA.
521. Cashdollar, Nathan; Du, Antao; Mueller, Susanne G.; Schuff, Norbert; Stables, Lara; Truran, Diana; Weiner, Michael W. Effects of Aging on Hippocampal Subfields and Whole Brain Gray and White Matter Volumes Measured at 4 Tesla. Application to SWI. Proc. Intl. Soc. Magn. Med. 14th Scientific Meeting, 2006, p. 3128, Seattle, WA.
522. Jacob, Mathew; Jahng, Geon-Ho; Ji, Jim X.; Liang, Zhi-Pei; Raj, Ashish; Schuff, Norbert; T, Hemanth; Weiner, Machael W.; Zhang, Yu; Zhu, Xiaoping. Evaluation of Sensitivity Encoded Diffusion Tensor Imaging at 4T. ISMRM 14th Scientific Meeting, 2006, p. 2450, Seattle, WA.
523. Ebel, Andreas; Schuff, Norbert; Weiner, Michael W. Factor-2 Acceleration for 3D EPSI at 4T Using Modified Blipped Phase-Encoding. Proc. Intl. Soc. Magn. Med. 14th Scientific Meeting, 2006, p. 3071, Seattle, WA.
524. Jahng, Geon-Ho; Matson, Gerald B.; Schuff, Norbert; Weiner, Michael W. Improvements to Control Scan of ASL-Perfusion MRI by Improving Null Pulse for Use with the Repeated Shallow Flip Angle Excitations. Proc. Intl. Soc. Magn. Med. 14th Scientific Meeting, 2006, p. 3433, Seattle, WA.
525. Ebel, Andreas; Maudsley, Andrew A.; Schuff, Norbert; Weiner, Michael W. Local B₀-Shift Correction for 3D EPSI of Human Brain at 1.5 and 4 Tesla. Proc. Intl. Soc. Magn. Med. 14th Scientific Meeting, 2006, p. 3074, Seattle, WA.
526. Jahng, Geon-Ho; Schuff, Norbert; Weiner, Michael W. Measurement of White Matter Perfusion Using ASL-MRI at 4T. Proc. Intl. Soc. Magn. Med. 14th Scientific Meeting, 2006, p. 3431, Seattle, WA.

Curriculum Vitae - Michael W. Weiner, M.D.

527. Bayne, Whitney; Chui, Hellen Chang; Jagust, William J.; Jahng, G-H; Kramer, Joel; Miller, Bruce L.; Mori, Susumu; Mueller, Susanne; Schad, L; Schuff, Norbert; Weiner, Michael W.; Yaffe, Kristine; Zhang, Yu. Regional Degradation of White Matter Ultrastructure in Mild Cognitive Impairment and Alzheimer's Disease by Diffusion Tensor Imaging. Proc. Intl. Soc. Magn. Med. 14th Scientific Meeting, 2006, p. 2021, Seattle, WA.
528. Du, An-Tao; Jahng, Geon-Ho; Schuff, Norbert; Weiner, Michael W.; Zhang, Yu. Regional Variability of Aging and Gender Difference in Human Corpus Callosum: A Diffusion Tensor MRI Study at 4 Tesla. Proc. Intl. Soc. Magn. Med. 14th Scientific Meeting, 2006, p. 1083, Seattle, WA.
529. Ebel, Andreas; Ji, Jim X.; Schuff, Norbert; Weiner, Michael W.; Zhu, Xiaoping. Sensitivity Encoded Three Dimensional Echo Planar Spectroscopic Imaging (3D-EPSI) of Human Brain at 4T. Proc. Intl. Soc. Magn. Med. 14th Scientific Meeting, 2006, p. 3075, Seattle, WA.
530. Zhang Y, Schuff N, Jahng GH, Bayne W, Mori S, Schad L, Mueller S, Kramer J, Yaffe K, Chui HC, Jagust WJ, Miller BL, Weiner MW.: Regional Degradation of White Matter Ultrastructure in Mild Cognitive Impairment and Alzheimer's Disease by Diffusion Tensor Imaging. Proc. Intl. Soc. Magn. Med. 14th Scientific Meeting, 2006, p. 721, Seattle, WA.
531. Zhang Y, Jahng GH, Du AT, Weiner MW, Schuff N.: Regional Variability of Aging and Gender Difference in Human Corpus Callosum: A Diffusion Tensor MRI Study at 4 Tesla. Proc. Intl. Soc. Magn. Med. 14th Scientific Meeting, 2006, p. 1083, Seattle, WA.
532. Weiner MW, Zhang Y, Jahng G-H, Bayne W, Mori S, Schad L, Mueller S, Du AT, Kramer J, Yaffe K, Chui HL, Jagust WJ, Miller BL, Schuff N.: Improved classification of MCI and Alzheimer's Disease using diffusion tensor imaging of cingulum white matter. Alzheimer's Association 10th International Conference on Alzheimer's Disease and Related Disorders. Madrid, Spain. 2(3 Suppl 1): S13 (O1-03-05). July 15-20, 2006.
533. Schuff N, Zhang Y, Du A, Mueller S, Hlavin J, Jahng G, Stables L, Cashdollar N, Weiner MW.: Patterns of age-related reduced cerebral blood flow and diminished white matter integrity by high-field perfusion and diffusion MRI. Alzheimer's Association 10th International Conference on Alzheimer's Disease and Related Disorders. Madrid, Spain. 2(3 Suppl 1): S65 (O3-06-03). July 15-20, 2006.
534. Johnson JK, Chao LL, Gazzaley A, Weiner MW, Kramer JH, Freeman KM, Buckley S, Miller BL. Frontal lobe MRI volumes differ in amnestic and executive subgroups of MCI. Alzheimer's Association 10th International Conference on Alzheimer's Disease and Related Disorders. Madrid, Spain. 2(3 Suppl 1): S304 (P2-233). July 15-20, 2006.
535. Freeman KM, Kramer JH, Gazzaley A, Miller BL, Weiner MW, Raptentsetsang S, Chao L, Johnson JK. Cognitive correlates of frontal lobe and hippocampal volumes in MCI. Alzheimer's Association 10th International Conference on Alzheimer's Disease and Related Disorders. Madrid, Spain. 2(3 Suppl 1): S305 (P2-235). July 15-20, 2006.

Curriculum Vitae - Michael W. Weiner, M.D.

536. Weiner MW, Thal LJ, Petersen RC, Jack Jr. CR, Jagust W, Trojanowski JQ, Beckett LA. Imaging biomarkers to monitor treatment effects for Alzheimer's Disease trials: The Alzheimer's Disease Imaging Initiative. Alzheimer's Association 10th International Conference on Alzheimer's Disease and Related Disorders. Madrid, Spain. 2(3 Suppl 1): S311 (P2-254). July 15-20, 2006.
537. Young K, Schuff N, Du A, Lerch J, Evans AC, Bartzokis G, Weiner MW. Detection and classification of dementias using generalized complexity estimates. Alzheimer's Association 10th International Conference on Alzheimer's Disease and Related Disorders. Madrid, Spain. 2(3 Suppl 1): S315 (P2-263). July 15-20, 2006.
538. Weiner MW, Fox-Bosetti S, Clevenger E, Kornak J, Schuff N. Improved statistical power to determine disease modifying effects using a randomized start MRI study. Alzheimer's Association 10th International Conference on Alzheimer's Disease and Related Disorders. Madrid, Spain. 2(3 Suppl 1): S316 (P2-265). July 15-20, 2006.
539. Cardenas VA, Chao LL, Studholme C, Buckley ST, Cashdollar NM, Schuff N, Weiner MW. Regions of brain atrophy that predict cognitive decline. Alzheimer's Association 10th International Conference on Alzheimer's Disease and Related Disorders. Madrid, Spain. 2(3 Suppl 1): S344 (P2-350). July 15-20, 2006.
540. Chao LL, Schuff N, Duarte A, Buckley ST, Kornak J, Kramer JH, Yaffe K, Miller BL, Weiner MW. Predicting cognitive decline in MCI and healthy aging with structural and perfusion MRI and MRS. Alzheimer's Association 10th International Conference on Alzheimer's Disease and Related Disorders. Madrid, Spain. 2(3 Suppl 1): S348 (P2-359). July 15-20, 2006.
541. Schuff N, Du A, Rosen H, Gorno-Tempini ML, Kramer J, Miller BL, Weiner MW. Cortical thinning in Alzheimer's disease and frontotemporal dementia. Alzheimer's Association 10th International Conference on Alzheimer's Disease and Related Disorders. Madrid, Spain. 2(3 Suppl 1): S348 (P2-360). July 15-20, 2006.
542. Chao LL, Schuff N, Clevenger E, Gorno-Tempini ML, Rosen HJ, Kramer JH, Yaffe K, Miller BL, Weiner MW. Different patterns of gray and white matter atrophy in Alzheimer's disease and subtypes of frontotemporal lobar dementia. Alzheimer's Association 10th International Conference on Alzheimer's Disease and Related Disorders. Madrid, Spain. 2(3 Suppl 1): S349 (P2-361). July 15-20, 2006.
543. Mueller SG, Stables L, Du A, Cashdollar NM, Schuff N, Weiner MW. Effects of aging on whole brain gray and white matter volumes and hippocampal subfields. Alzheimer's Association 10th International Conference on Alzheimer's Disease and Related Disorders. Madrid, Spain. 2(3 Suppl 1): S351 (P2-365). July 15-20, 2006.
544. Lerch J, Zijdenbos A, Janke A, Evans A, Schuff N, Weiner M. Progressive cortical thickness decline in Alzheimer's disease. Alzheimer's Association 10th International Conference on

Curriculum Vitae - Michael W. Weiner, M.D.

Alzheimer's Disease and Related Disorders. Madrid, Spain. 2(3 Suppl 1): S351 (P2-367). July 15-20, 2006.

545. Zijdenbos AP, Lerch JP, Evans AC, Schuff N, Weiner MW. An integrated framework for computational neuroanatomy: Comparing cortical thickness against manual tracing of the hippocampus. Alzheimer's Association 10th International Conference on Alzheimer's Disease and Related Disorders. Madrid, Spain. 2(3 Suppl 1): S353 (P2-370). July 15-20, 2006.
546. Mueller SG, Cashdollar NM, Studholme C, Cardenas-Nicolson V, Green M, Kasten J, Reed B, Mungas D, Kramer J, Schuff N, Chui HC, Weiner MW. Influence of white matter lesion location on cortical and hippocampal gray matter atrophy in Alzheimer's disease, vascular dementia and cognitively normal elderly. Alzheimer's Association 10th International Conference on Alzheimer's Disease and Related Disorders. Madrid, Spain. 2(3 Suppl 1): S355 (P2-376). July 15-20, 2006.
547. Du A-T, Schuff N, Chao LL, Kornak J, Ezekiel F, Jagust WJ, Kramer JH, Reed BR, Miller BL, Norman D, Chui HC, Weiner MW. White matter lesions are associated with cortical atrophy more than entorhinal and hippocampal atrophy. International Congress Series 1290 Functional and Molecular Imaging of Stroke and Dementia: Updates in Diagnosis, Treatment, and Monitoring, 89-100, 2006.
548. Johnson NA, Jahng G-H, Weiner MW, Miller BL, Chui HC, Jagust WJ, Gorno-Tempini ML, Schuff N. Pattern of cerebral hypoperfusion in Alzheimer's disease and mild cognitive impairment measured with arterial spin-labeling MR imaging: Initial experience. International Congress Series 1290 Functional and Molecular Imaging of Stroke and Dementia: Updates in Diagnosis, Treatment, and Monitoring, 108-122, 2006.
549. Weiner MW, Thal L, Petersen R, Jack C, Jagust W, Trojanowski J, Shaw L, Toga A, Beckett L, Stables L, Mueller S, Lorenzen P, Schuff N. MRI of Alzheimer's and Parkinson's: The Alzheimer's Disease Neuroimaging Initiative (ADNI-Info.Org). Neurodegenerative Dis, 4(Suppl 1):276, 832, 2007.
550. Mueller SG, Schuff N, Raptentsetsang S, Stables L, Weiner MW.: Distinct Patterns of Atrophy of Hippocampal Subfields in Alzheimer's Disease (AD) and Mild Cognitive Impairment (MCI). Alzheimer's & Dementia, 3(3 Suppl 2):S113 P-050. Second Alzheimer's Association International Conference on Prevention of Dementia, Washington, DC. June 9-12, 2007.
551. Zhu X, Schuff N, Guenter M, Feinberg D, Zhang Y, Jahng G, Weiner MW.: Age and Alzheimer's Disease Related Effects on Cerebral Blood Flow and Arterial Transit Time of Posterior Cingulate Cortex with Serial Arterial Spin Labeling MRI. Alzheimer's & Dementia, 3(3 Suppl 2):S176 O1-05-02. Second Alzheimer's Association International Conference on Prevention of Dementia, Washington, DC. June 9-12, 2007.
552. Gunter JL, Bernstein MA, Britson PJ, Felmlee JP, Schuff N, Weiner M, Jack CR.: MRI system tracking and correction using the ADNI phantom. Alzheimer's & Dementia, 3(3

Curriculum Vitae - Michael W. Weiner, M.D.

- Suppl 2):S109 P-038. Second Alzheimer's Association International Conference on Prevention of Dementia, Washington, DC. June 9-12, 2007.
553. Chen K, Reiman EM, Alexander GE, Lee W, Reschke C, Smilovici O, Bandy D, Weiner MW, Koeppe RA, Jagust WJ.: Six-month cerebral metabolic declines in Alzheimer's Disease, amnestic mild cognitive impairment and elderly normal control groups: Preliminary findings from the Alzheimer's Disease Neuroimaging Initiative. *Alzheimer's & Dementia*, 3(3 Suppl 2):S174 O1-04-05. Second Alzheimer's Association International Conference on Prevention of Dementia, Washington, DC. June 9-12, 2007.
554. Chen K, Reiman EM, Alexander GE, Smilovici O, Lee W, Reschke C, Bandy D, Foster NL, Weiner MW, Koeppe RA, Jagust WJ.: The pattern and severity of FDG PET abnormalities in Alzheimer's Disease and amnestic mild cognitive impairment: Preliminary findings from the Alzheimer's Disease Neuroimaging Initiative. *Alzheimer's & Dementia*, 3(3 Suppl 2):S103 P-024. Second Alzheimer's Association International Conference on Prevention of Dementia, Washington, DC. June 9-12, 2007.
555. Alexander GE, Chen K, Reiman EM, Aschenbrenner M, Merkley TL, Hanson KD, Dale AM, Bernstein MA, Kornak J, Schuff N, Fox NC, Thompson PM, Weiner MW, Jack CR Jr.: Regional gray matter reductions in Alzheimer's dementia and amnestic mild cognitive impairment: Preliminary findings from the Alzheimer's Disease Neuroimaging Initiative using voxel-based morphometry. *Alzheimer's & Dementia*, 3(3 Suppl 2):S102 P-020. Second Alzheimer's Association International Conference on Prevention of Dementia, Washington, DC, June 9-12, 2007.
556. Reiman EM, Chen K, Alexander GE, Reschke C, Lee W, Smilovici O, Buckley S, Truran D, Schuff N, Muller S, Weiner MW, Caselli RJ.: PET Measurements of posterior cingulate glucose metabolism are superior to MRI measurement of hippocampal volume in distinguishing cognitively normal persons at differential genetic risk for Alzheimer's disease. *Alzheimer's & Dementia*, 3(3 Suppl 2):S177 O1-05-03. Second Alzheimer's Association International Conference on Prevention of Dementia, Washington, DC. June 9-12, 2007.
557. Chao LL, Schuff N, Buckley ST, Zhang Y, Mungas D, Kramer JH, Yaffe K, Miller BL, Weiner MW.: Predicting cognitive decline in non-demented elderly with MRI, DTI and longitudinal single-voxel spectroscopic imaging. *Alzheimer's & Dementia*, 3(3 Suppl 2):S178 O1-05-05. Second Alzheimer's Association International Conference on Prevention of Dementia, Washington, DC. June 9-12, 2007.
558. Mueller SG, Schuff N, Jahng GH, Weiner MW.: Hippocampal CA1 volume correlates with the known neuroanatomical cortical and subcortical projections of the hippocampus: A validation study. *Alzheimer's & Dementia*, 3(3 Suppl 2):S113 P-051. Second Alzheimer's Association International Conference on Prevention of Dementia, Washington, DC. June 9-12, 2007.
559. Weiner MW, Thal L, Petersen R, Jack C, Jagust W, Trojanowski J, Shaw L, Toga A, Beckett L.: The Alzheimer's Disease Imaging Initiative: Progress report. *Alzheimer's & Dementia*,

Curriculum Vitae - Michael W. Weiner, M.D.

- 3(3 Suppl 2):S174 O1-04-04. Second Alzheimer's Association International Conference on Prevention of Dementia, Washington, DC. June 9-12, 2007.
560. Zhang Y, Du AT, Jahng GH, Mueller S, Hlavin J, Stables L, Weiner MW, Schuff N.: Regional Pattern of Age-Related Water Diffusion Changes in Human Brain by Concordance and Dissociation Analysis of High-Field DTI. Intl. Soc. Magn. Med. 15th Scientific Meeting, May 19-25, 2007, Berlin, Germany, Submitted.
561. Zhang Y, Schuff N, Buckley S, Du A, Mueller S, Hlavin J, Weiner MW.: White Matter Degradation in Normal Aging and APOE4 Gene Carriers and Alzheimer Dementia. Alzheimer's & Dementia, 3(3 Suppl 2):S121 P-070. Second Alzheimer's Association International Conference on Prevention of Dementia, Washington, DC. June 9-12, 2007.
562. Gazdzinski S, Durazzo TC, Weiner MW, Meyerhoff DJ.: Do Treated and Treatment-Naïve Alcoholics Derive From Different Populations? A Magnetic Resonance Study. Research Society on Alcoholism Annual Meeting, 2007. Submitted.
563. Bae M, Lee S, Ryu C, Jahng G, Schuff N, Weiner MW.: Selecting the EPI Frequency Encoding Bandwidth at High Field MRI is affecting on DTI Anisotropy Indexes. RSNA, 2007. Submitted.
564. Fletcher PT, Wang AY, Tasdizen T, Chen K, Jagust WJ, Koeppe RA, Reiman EM, Weiner MW, Minoshima S, Foster NL.: Variability of Normal Cerebral Glucose Metabolism from the Alzheimer's Disease Neuroimaging Initiative (ADNI): Implication for Clinical Trials. Annals of Neurology, 62(Suppl 11):S52-3. American Neurological Association 132nd Annual Meeting, Washington, DC. October 7-10, 2007.
565. Ji J, Zhu X, Li K, Schuff N, Guenther M, Feinberg D, **Weiner M.** Dynamic Arterial Spin Labeling Perfusion Imaging at 4T Using Parallel Imaging: Effects on Parametric Mapping. ISMRM, Berlin, p. 1410, 2007.
566. Zhu X, Ji JX, Guenther M, Zhan W, Ramanna S, Li K-L, Feinberg DA, Matson GB, Weiner MW, Schuff N. Ultrafast Single Shot Volumetric GRASE ASL with An Improved SENSE for Mapping Brain Kinetics. Submitted to ISMRM 2008.
567. Weiner M, Schuff N, Mueller S, Zhan W, Zhang Y, Miller B, Chui H. Multimodality MRI of neurodegenerative diseases. Keynote SPIE Medical Imaging, San Diego, February 17-21, 2008.
568. Weiner MW, Chao L, Mueller S, Cardenas-Nicolson V, Studholme C, Schuff N, Kornak J, Miller B, Yaffe K, Kramer J, Mungas D. Prediction of Cognitive Decline with Structural, Perfusion and Diffusion Tensor MRI and MRS at 1.5 and 4 T. 6th Annual MCI Symposium, Miami Beach, FL, 2008.
569. Weiner MW, Chao L, Mueller S, Cardenas-Nicolson V, Studholme C, Schuff N, Kornak J, Miller B, Yaffe K, Kramer J, Mungas D. The Future of Neuroimaging in Dementia. 18th

Curriculum Vitae - Michael W. Weiner, M.D.

Annual Rotman Research Institute Conference: Neuroimaging in Dementia, Toronto, ON, Canada, 2008.

- 570. Morra J, Tu Z, Apostolova LG, Green AE, Avedissian C, Madsen SK, Parikshak N, Hua X, Toga AW, Jack CR, Schuff N, Weiner MW, Thompson PM (2008). Automated 3D Mapping of Hippocampal Atrophy and its Clinical Correlates in 400 Subjects with Alzheimer's Disease, Mild Cognitive Impairment, and Elderly Controls, ISBI 2008.
- 571. Weiner MW, Aisen P, Petersen R, Jack C, Jagust W, Trojanowski J, Shaw L, Toga A, Beckett L, Gamst A. Alzheimer's Disease Neuroimaging Initiative (ADNI): Progress Report. 11th International Conference on Alzheimer's Disease, Chicago, IL, 2008.
- 572. Weiner MW, Chao L, Mueller S, Cardenas-Nicolson V, Studholme C, Schuff N, Kornak J, Miller B, Yaffe K, Kramer J, Mungas D. The Future of Neuroimaging in Dementia, 1st International NEUREST Retreat, Schloss Ringberg, Bavaria, Germany, 2008.
- 573. Zhan W, Zhang Y, Lorenzen P, Mueller SG, Weiner MW. Correlations between DTI and FLAIR images reveal the relationships of microscopic and macroscopic white matter degeneration in elderly subjects. Proc. SPIE, 6916:691609, 2008.
- 574. Morra JH, Tu Z, Apostolova LG, Green AE, Avedissian C, Madsen SK, Parikshak N, Hua X, Toga AW, Jack Jr CR, Schuff N, Weiner MW, Thompson PM. Mapping Hippocampal Degeneration in 400 Subjects with a Novel Automated Segmentation Approach. The Fifth IEEE International Symposium on Biomedical Imaging, Paris, France, May 14-17, 2008.
- 575. Morra J, Tu Z, Apostolova LG, Green AE, Avedissian C, Madsen SK, Parikshak N, Hua X, Toga AW, Jack CR, Schuff N, Weiner MW, Thompson PM (2008). Mapping Hippocampal Degeneration in 400 Subjects with a Novel Automated Segmentation Approach, 13th Annual Meeting of the Organization for Human Brain Mapping (OHB), Melbourne, Australia, June 15-19, 2008.
- 576. Gazdzinski S, Kornak J, Weiner MW, Meyerhoff DJ. Body Fat and Magnetic Resonance Markers of Brain Integrity in Healthy Middle-Aged Healthy Adults. Poster at the AAN 2008. Neurology, 70(Suppl 1): A445, 2008.

11th International Conference on Alzheimer's Disease and Related Disorders, Chicago, IL, 2008

- 577. Weiner MW. Alzheimer's Disease Neuroimaging Initiative (ADNI): Progress Report. S1-01-01, Page T99.
- 578. Mueller S, Schuff N, Raptentsetsang S, Yaffe K, Madison C, Miller B, Weiner M. Patterns of Hippocampal Atrophy in Alzheimer's Disease, Mild Cognitive Impairment and ApoE4. O1-02-04, Page T109.
- 579. Apostolova LG, Morra JH, Green AH, Hwang K, Avedissian C, Parikshak N, Cummings JL, Toga AW, Jack CR, Weiner MW, Thompson PM. Automated Longitudinal 3-D Mapping of

Curriculum Vitae - Michael W. Weiner, M.D.

Hippocampal ADAS-cog Delayed Recall Effects in 293 Normal Elderly, Mild Cognitive Impairment and Alzheimer's Disease Subjects. O1-02-05, Page T110.

580. Reiman EM, Chen K, Ayutyanont N, Lee W, Bandy D, Reschke C, Alexander GE, Weiner MW, Koeppe RA, Foster NL, Jagust WJ. Twelve-Month Cerebral Metabolic Declines in Probable Alzheimer's Disease and Amnestic Mild Cognitive Impairment: Preliminary Findings From the Alzheimer's Disease Neuroimaging Initiative (ADNI).
581. Schuff N, Woerner N, Boreta L, Kornfield T, Jack Jr. CR, Weiner MW. Rate of Hippocampal Atrophy in the Alzheimer's Disease Neuroimaging Initiative (ADNI): Effects of ApoE4 and Value of Additional MRI Scans. O3-03-06, Page T164.
582. Donohue M, Aisen P, Gamst A, Weiner M. Using the Alzheimer's Disease Neuroimaging Initiative (ADNI) Data to Improve Power For Clinical Trials.
583. Pa J, Boxer AL, Chao LL, Weiner MW, Freeman KM, Miller BL, Johnson JK. MR Imaging and Clinical Characteristics of Dysexecutive and Amnestic Mild Cognitive Impairment. P1-169, Page T257.
584. Chao LL, Pa J, Weiner MW, Miller BL, Schuff N, Freeman KM, Johnson JK. Patterns of Cerebral Hypoperfusion in Amnestic and Dysexecutive Mild Cognitive Impairment Subgroups. IC-P1-009, Page T13 & P1-181, Page T261.
585. Alexander GE, Hanson KD, Chen K, Reiman EM, Bernstein MA, Kornak J, Schuff NW, Fox NC, Thompson PM, Weiner MW, Jack CR. Six-Month MRI Gray Matter Declines in Alzheimer Dementia Evaluated by Voxel-Based Morphometry with Multivariate Network Analysis: Preliminary Findings from the Alzheimer's Disease Neuroimaging Initiative (ADNI). IC-03-06, Page T8, & P1-216, Page T273.
586. Cardenas VA, Chao LL, Studhorne C, Schuff N, Weiner MW. Deformation Morphometry Reveals Longitudinal Atrophy Related to Cognitive Decline and APOE-e4 Status. IC-P2-084, Page T41 & PI-226, Page T277.
587. Foster NL, Wang AY, Levy JA, Koeppe RA, Jagust WJ, Chen K, Reiman EM, Weiner MW. Frequency of Hemispheric Metabolic Asymmetry in Probable Alzheimer's Disease. IC-P2-098, Page T47 & PI-244, Page T286.
588. Landau SM, Madison C, Wu D, Cheung C, Foster N, Reiman E, Koeppe R, Weiner M, Jagust WJ. Pinpointing Change in Alzheimer's Disease: Longitudinal FDG-PET Analysis From the Alzheimer's Disease Neuroimaging Initiative (ADNI). PI-258, Page T291.
589. Zhang Y, Schuff N, Du A-T, Zhan W, Rosen HJ, Kramer JH, Gorno-Tempini ML, Miller BL, Weiner MW. Frontotemporal Dementia and Alzheimer's Disease Assessment Using Diffusion Tensor Imaging. IC-P1-071, Page T36 & PI-310, Page T311.

Curriculum Vitae - Michael W. Weiner, M.D.

590. Chen K, Lee W, Liu X, Alexander G, Bandy D, Reschke C, Foster N, Weiner M, Koeppe R, Jagust W, Reiman E. The Consistency of Hypometabolic Brain Voxels in Probable Alzheimer's Disease and Amnestic Mild Cognitive Impairment Patients from the Alzheimer's Disease Neuroimaging Initiative (ADNI). PI-338, Page T318.
591. Gunter JL, Borowski B, Bernstein M, Ward C, Britson P, Felmlee J, Schuff N, Weiner M, Jack C. Systematics of the Alzheimer's Disease Neuroimaging Initiative (ADNI) Phantom. P2-011, Page T369.
592. Gunter JL, Borowski B, Britson P, Bernstein M, Ward C, Felmlee J, Schuff N, Weiner M, Jack C. Alzheimer's Disease Neuroimaging Initiative (ADNI) Phantom and Scanner Longitudinal Performance. P2-012, Page T370.
593. Lee W, Langbaum JBS, Chen K, Recshke C, Bandy D, Alexander GE, Foster NL, Weiner MW, Koeppe RA, Jagust WJ, Reiman EM. Categorical and Correlational Analyses of Baseline Fluorodeoxyglucose Positron Emission Tomography Images from the Alzheimer's Disease Neuroimaging Initiative (ADNI). IC-P1-036, Page T23 & P2-037, Page T379.
594. Petersen RC, Aisen P, Beckett L, Donohue M, Weng Q, Salmon D, Weiner M. Alzheimer's Disease Neuroimaging Initiative (ADNI): Baseline Characteristics. P3-040, Page T528.
595. Yang DW, Rosen HJ, Gorno-Tempini M-L, Miller BL, Kramer JH, Weiner M, Sollberger M. Structural Anatomy of Environmental Dependency Syndrome in Neurodegenerative Disease. IC-P1-068, Page T35.
596. Chen K, Reschke C, Lee W, Bandy D, Foster NL, Weiner MW, Koeppe RA, Jagust WJ, Reiman EM. The Pattern of Cerebral Hypometabolism in Amnestic Mild Cognitive Impairment and Its Relationship to Subsequent Conversion to Probable Alzheimer's Disease: Preliminary Findings from the Alzheimer's Disease Neuroimaging Initiative. IC-P2-086, Page T42.
597. Madison C, Landau S, Cheung C, Lal R, Foster N, Reiman E, Koeppe R, Weiner M, Jagust W. Meta-Analysis ROIs and Minimal Deformation Templates Improve PET-FDG as a Candidate Biomarker in Alzheimer's Disease. IC-P2-114, Page T53.
598. Reiman EM, Chen K, Ayutyanont N, Lee W, Bandy D, Reschke C, Alexander GE, Weiner MW, Koeppe RA, Foster NL, Jagust WJ. Twelve-Month Cerebral Metabolic Declines in Probable Alzheimer's Disease and Amnestic Mild Cognitive Impairment: Preliminary Findings from the Alzheimer's Disease Neuroimaging Initiative. IC-P2-128, Page T58.
599. Gunter JL, Borowski B, Britson P, Bernstein M, Ward C, Felmlee J, Schuff N, Weiner M, Jack CR, the Alzheimer's Disease Neuroimaging Initiative. ADNI Phantom & Scanner Longitudinal Performance. IC-P3-181, Page T80.
600. Mueller S, Schuff N, Raptentsetsang S, Yaffe K, Madison C, Miller B, Weiner M. Patterns of Hippocampal Atrophy in Alzheimer's Disease, Mild Cognitive Impairment and APOE4. IC-P3-200, Page T86.

Curriculum Vitae - Michael W. Weiner, M.D.

601. Schuff N, Woerner N, Boreta L, Kornfield T, Jack Jr. CR, Weiner MW. Rate of Hippocampal Atrophy in the Alzheimer's Disease Neuroimaging Initiative (ADNI): Effects of APOE4 and Value of Additional MRI Scans. IC-P3-213, Page T91.
602. Thompson P, Apostolova LG, Morra JH, Green AE, Hwang K, Avedissian C, Parikshak N, Cummings JL, Toga AW, Jack CR, Weiner MW. Automated Longitudinal 3D Mapping of Hippocampal ADASCPG Delayed Recall Effects in 293 Normal Elderly, MCI and AD Subjects. IC-P3-223, Page T95.
603. Weiner M, Mueller S, Mack W, Mungas D, Greene M, Schuff N, Chui H. Influence of lobar gray matter and white matter lesion load on cognitive function and mood. The 4th Congress of the International Society for Vascular Behavioural and Cognitive Disorders (VAS-COG), Singapore, January 14-16, 2009.
604. Weiner M, DeCarli C, Carmichael O, Aisen P, Petersen R, Jack C, Jagust W, Trojanowski J, Shaw L, Toga A, Beckett L, Gamst A. Alzheimer's disease neuroimaging initiative (ADNI); progress report concerning effects of cerebrovascular disease on progression. The 4th Congress of the International Society for Vascular Behavioural and Cognitive Disorders (VAS-COG), Singapore, January 14-16, 2009.
605. Gruhl J, Gibbons L, Curtis SM, Erosheva E, Mueller S, Weiner M, Chui H, Mungas D, Crane P. Increased volume of frontal lobe white matter signal hyperintensities (WMH) was associated with more rapid decline in executive functioning. The 4th Congress of the International Society for Vascular Behavioural and Cognitive Disorders (VAS-COG), Singapore, January 14-16, 2009.
606. Zarow C, Wang L, Weiner M, Csernansky J. Hippocampal sclerosis can be distinguished from Alzheimer disease on MRI. The 4th Congress of the International Society for Vascular Behavioural and Cognitive Disorders (VAS-COG), Singapore, January 14-16, 2009.
607. Chou Y-Y, Lepore N, Avedissian C, Madsen SK, Hua X, Jack CR, Weiner MW, Toga AW, Thompson PM, the Alzheimer's Disease Neuroimaging Initiative. Mapping Ventricular Expansion and its Clinical Correlates in Alzheimer's disease and Mild Cognitive Impairment using Multi-Atlas Fluid Image Alignment. Proceedings of the SPIE Conference on Image Processing, Orlando, FL, February 7-12, 2009.
608. Chou YY, Lepore N, Avedissian C, Madsen SK, Hua X, Jack CR, Weiner MW, Toga AW, Thompson PM. Mapping Ventricular Expansion and its Clinical Correlates in Alzheimer's Disease and Mild Cognitive Impairment using Multi-Atlas Fluid Image Alignment. SPIE Medical Imaging 2009, SPIE Paper Number 7259-111, February 9, 2009.
609. Schuff N, Zhang Y, Zhan W, Kang G, Glass G, Nezamzadeh M, Young K, Weiner MW, Marks W. Mapping of Brain Alterations in Parkinson's Disease by Multimodal MRI. 9th International Conference AD/PD Prague, March 11-15, 2009.

Curriculum Vitae - Michael W. Weiner, M.D.

610. Apostolova LG, Green AE, Hwang K, Morra JH, Cummings JL, Toga AW, Jack CR, Weiner MW, Thompson PM. Mapping correlations between serum Abeta and tau and hippocampal atrophy measures in 282 ADNI subjects. AAN 61st Annual Meeting, Seattle, WA, April 25-May 2, 2009.
611. Haws K, Kramer J, Laluz V, Miller B, Rosen H, Growdon M, Jang J, Weiner M. Semantic Memory Associated with the Left Anterior Temporal Lobe. AAN 61st Annual Meeting, Seattle, WA, April 25-May 2, 2009.
612. Gooblar J, Heflin L, Mack W, Mungas D, Reed B, Weiner M, Chui H, Kramer J. Effects of White Matter and Lacunar Volume on a Global Measure of Depression among Cognitively Intact Individuals. AAN 61st Annual Meeting, Seattle, WA, April 25-May 2, 2009.
613. Posner H, Cano S, Aisen P, Selnes O, Stern Y, Thomas R, Weiner M, Zajicek J, Zeger S, Hobart J. The ADAS-cog's Performance as a Measure - Lessons from the ADNI Study: Part 1 – Evaluation Using Traditional Psychometric Methods. AAN 61st Annual Meeting, Seattle, WA, April 25-May 2, 2009.
614. Tartaglia MC, Zhang Y, Racine C, Neuhaus J, Chao L, Kramer J, Rosen H, Miller B, Weiner M. Executive Dysfunction in Frontotemporal Dementia Is Related to Abnormalities in Frontal White Matter Tracts. AAN 61st Annual Meeting, Seattle, WA, April 25-May 2, 2009.
615. Hobart J, Posner H, Aisen P, Selnes O, Stern Y, Thomas R, Weiner M, Zajicek J, Zeger S, Cano S. The ADAS-cog's Performance as a Measure – Lessons from the ADNI Study: Part 3 – Do the Scale Modifications Add Value? AAN 61st Annual Meeting, Seattle, WA, April 25-May 2, 2009.
616. Weiner MW, Aisen P, Petersen R, Jack C, Jagust W, Trojanowski J, Shaw L, Toga A, Beckett L, Gamst A. Early Diagnostic Markers in Alzheimer's Disease – The ADNI Initiative. Alzheimer therapy, still a challenge (?), Stockholm, Sweden, May 6-9, 2009.
617. Hua X, Yanovsky I, Leow AD, Lee S, Ho AJ, Parikhshak N, Toga AW, Jack CR, Weiner MW, Thompson PM. Tensor-based morphometry as surrogate marker for Alzheimer's disease and mild cognitive impairment: Optimizing Statistical Power. Organization for Human Brain Mapping, 2009.
618. Morra JH, Tu Z, Apostolova LG, Green AE, Avedissian C, Madsen SK, Parikhshak N, Toga AW, Jack CR, Schuff N, Weiner MW, Thompson PM. Automated Hippocampal Segmentation and Mapping Reveals Genetically Accelerated Tissue Loss in 1-year repeat MRI data from 490 Alzheimer's Disease, MCI, and Control Subjects. Organization for Human Brain Mapping, 2009.
619. Apostolova LG, Hwang K, Andrawis J, Green AE, Babakchanian S, Morra JH, Cummings JL, Toga AW, Jack CR, Weiner MW, Thompson PM. 3D mapping of associations between Amyloid-PET and CSF biomarkers and hippocampal morphology. Organization for Human Brain Mapping, 2009.

Curriculum Vitae - Michael W. Weiner, M.D.

620. Weiner M. Using biomarkers for Alzheimer's prevention trials: lessons from the Alzheimer's disease neuroimaging initiative (ADNI). XIXth IAGG World Congress of Gerontology and Geriatrics, Paris, France, July 5-9, 2009.
621. Tosun D, Schuff N, Raptentsetsang S, Truran-Sacrey D, Shaw L, Trojanowski J, Weiner M. Associations Between Baseline Concentration of Alzheimer's disease Biochemical Markers and MRI Regional Rates of Brain Tissue Loss in ADNI Data. Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD), July 11-16, 2009.
622. Zhang Y, Schuff N, Ching C, Tosun D, Nezamzadeh M, Zhan W, Rosen HJ, Kramer JH, Gorno-Tempini ML, Miller BL, Weiner MW. Interrelation Between Gray and White Matter Alterations in Alzheimer's Disease and Frontotemporal Dementia. Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD), July 11-16, 2009.
623. Andrawis JP, Hwang KS, Green AE, Babakchanian S, Morra JH, Cummings JL, Toga AW, Trojanowski JQ, Shaw LM, Jack CR Jr, Weiner MW, Thompson PM, Apostolova LG. 3-D Mapping of Associations Amongst Amyloid-PET and CSF Biomarkers and Hippocampal Morphology. Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD), July 11-16, 2009.
624. Thompson P, Hua X, Yanovsky I, Leow AD, Lee S, Ho AJ, Parikshak N, Toga AW, Jack CR Jr, Weiner MW. Tensor-Based Morphometry as Surrogate Marker for Alzheimer's disease and Mild Cognitive Impairment: Optimizing Statistical Power. Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD), July 11-16, 2009.
625. Thompson, Hua X, Leow A, Morra JH, Apostolova LG, Lee S, Avedissian C, Madsen SK, Green AE, Toga AW, Jack CR Jr, Shaw LM, Trojanowski JQ, Weiner MW. Brain Changes in 676 ADNI Subjects: Summary of 10 Studies Using Tensor-Based Morphometry and Automated Hippocampal Mapping. Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD), July 11-16, 2009.
626. Schuff N, Raptentsetsang S, Tosun D, Truran D, Weiner MW. Rates of Regional Brain Atrophy and Gain in Power for Assessment of Cognitive Decline in Clinical Trials. Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD), July 11-16, 2009.
627. Yang DW, Sollberger M, Gorno-Tempini M-L, Rankin KP, Weiner MW, Miller BL. Different Effect of ApoE4 and E3 on Gray Matter Loss in Alzheimer's disease. Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD), July 11-16, 2009.
628. Shimizu S, Zhang Y, Miller BL, Kramer JH, Weiner MW, Schuff N. Concordance and Discordance Between Regional Reduction of Cerebral Blood Flow and Brain Atrophy in Frontotemporal Dementia. Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD), July 11-16, 2009.

Curriculum Vitae - Michael W. Weiner, M.D.

629. Posner H, Cano S, Aisen P, Selnes O, Stern Y, Thomas R, Weiner M, Zajicek J, Zeger S, Hobart J. The ADAS-Cog's Performance as a Measure: Lessons from the ADNI Study – Part 1, Evaluation using Traditional Psychometric Methods. Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD), July 11-16, 2009.
630. Hobart J, Posner H, Aisen P, Selnes O, Stern Y, Thomas R, Weiner M, Zajicek J, Zeger S, Cano S. The ADAS-Cog's Performance as a Measure: Lessons From the ADNI Study – Part 3, Do the Scale Modifications Add Value? Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD), July 11-16, 2009.
631. Mueller S, Chao LL, Buckley S, Schuff N, Weiner MW. Hippocampal Subfields are Superior to Total Hippocampal Volume for the Prediction of Memory Function and Decline: A Preliminary Study. Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD), July 11-16, 2009.
632. Zhan W, Zhang Y, Nezamzadeh M, Boreta L, Ching C, Schuff N, Weiner MW. Similarity in Patterns of White Matter Integrity Alteration Between Healthy ApoE-4 Carriers and Alzheimer's disease Patients. Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD), July 11-16, 2009.
633. Landau SM, Harvey D, Madison C, Foster NL, Reiman EM, Shaw LM, Trojanowski JQ, Petersen RC, Weiner MW, Jagust WJ. Comparing predictors of conversion: Data from the Alzheimer's disease Neuroimaging Initiative. Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD), July 11-16, 2009.
634. Vemuri P, Wiste HJ, Weigand SD, Shaw LM, Trojanowski JQ, Weiner M, Knopman DS, Petersen RC, Jack CR Jr. Comparing MRI and CSF Biomarkers in Alzheimer's Disease: Intergroup Discrimination and Predicting Clinical Change. Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD), July 11-16, 2009.
635. Cano S, Posner H, Aisen P, Selnes O, Stern Y, Thomas R, Weiner M, Zajicek J, Zeger S, Hobart J. The ADAS-Cog's Performance as a Measure – Lessons from the ADNI Study: Part 2 Evaluation Using Modern Psychometric Methods. Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD), July 11-16, 2009.
636. Weiner MW, Aisen P, Petersen R, Jack C, Jagust W, Trojanowski J, Shaw L, Toga A, Beckett L, Saykin A. Alzheimer's Disease Neuroimaging Initiative (ADNI); Progress Report. Second AD Translational Research Investigator's Meeting, Washington, DC, September 9-11, 2009.
637. Weiner M, Schuff N, Feinberg D, Guenther M, Kornak J, Liang Z-P, Wedeen V. Research Resources for MRI/MRS of Neurodegenerative Disease. NCRR/NIBIB P41 Investigator's Meeting, Bethesda, MD, October 13-14, 2009.
638. Stein JL, Hua X, Morra JH, Lee S, Ho AJ, Leow AD, Toga AW, Sul J, Kang HM, Eskin E, Saykin AJ, Shen L, Jack CR, Weiner MW, Thompson PM. Genome-wide association study of temporal lobe structure identifies novel quantitative trait loci for neurodegeneration in

Curriculum Vitae - Michael W. Weiner, M.D.

Alzheimer's disease, Society for Neuroscience Annual meeting, Chicago, October 17-21, 2009.

639. Weiner MW, Aisen P, Petersen R, Jack C, Jagust W, Trojanowski J, Shaw L, Toga A, Beckett L, Gamst A. MRI, PET, and CSF Biomarkers for Prediction and Monitoring the Progression of Alzheimer's Disease: The Alzheimer's Disease Neuroimaging Initiative. Clinical Trials on Alzheimer's Disease 2009, Las Vegas, NV, October 29-30, 2009.
640. Stein JL, Hua X, Lee S, Ho AJ, Leow AD, Toga AW, Saykin AJ, Shen L, Foroud T, Pankratz N, Huentelman MJ, Craig DW, Gerber JD, Allen A, Corneveaux J, Stephan DA, Webster J, DeChairo BM, Potkin SG, Jack CR, Weiner MW, Thompson PM (2010). Voxelwise Genome-Wide Association Study (vGWAS), 6th UC Irvine Conference on Imaging Genomics, Irvine, CA, USA, January 18-19, 2010.
641. Weiner MW, Aisen P, Petersen R, Jack C, Jagust W, Trojanowski J, Shaw L, Toga A, Beckett L, Gamst A. Biomarkers for monitoring the progression of Alzheimer's disease in clinical trials: The Alzheimer's Disease Neuroimaging Initiative. 1st International Congress on Alzheimer's disease and Advanced Neurotechnologies, Monaco, February 11-13, 2010.
642. Weiner MW, Aisen P, Petersen R, Jack C, Jagust W, Trojanowski J, Shaw L, Toga A, Beckett L, Gamst A. Biomarkers for monitoring the progression of Alzheimer's disease in clinical trials: the Alzheimer's Disease Neuroimaging Initiative. 11th International Geneva/Springfield Symposium on Advances in Alzheimer Therapy, Geneva, Switzerland, March 24-27, 2010.
643. Chou YY, Lepore N, Madsen SK, Saharan P, Hua X, Jack CR, Shaw LS, Trojanowski JQ, Weiner MW, Toga AW, Thompson PM (2010). Ventricular Maps in 804 Subjects Correlate with Cognitive Decline, CSF Pathology, and Imminent Alzheimer's Disease, ISBI 2010, Rotterdam, The Netherlands, April 14-17, 2010
644. Tosun D, Mojabi P, Weiner MW, Schuff N. Joint Contribution of Structural and Perfusion MRI for the Classification of the Alzheimer's disease. ISMRM 2010 Annual Meeting Clinical Needs & Technological Solutions, Stockholm, Sweden, May 1-7, 2010.
645. Tosun D, Insel P, Rosen H, Miller BL, Schuff N, Weiner MW. Classification Accuracy using Structural and Perfusion Weighted MRI in Dementia. 16th Annual Meeting of the Organization for Human Brain Mapping, Barcelona, Spain, June 6-10, 2010.
646. Hua X, Hibar DP, Lee S, Toga AW, Jack CR, Weiner MW, Thompson PM. Sex and age differences in brain atrophic rates: an ADNI study with N=1368 MRI scans. Organization for Human Brain Mapping, Barcelona, Spain, June 2010.
647. Kohannima O, Hua X, Hibar DP, Lee S, Chou YY, Toga AW, Jack CR, Weiner MW, Thompson PM. Boosting power for clinical trials using classifiers based on multiple biomarkers. Organization for Human Brain Mapping, Barcelona, Spain, June 2010.

Curriculum Vitae - Michael W. Weiner, M.D.

648. Ho AJ, Raji CA, Becker JT, Lopez OL, Kuller LH, Hua X, Lee S, Hibar D, Dinov ID, Stein JL, Jack CR, Weiner MW, Toga AW, Thompson PM. Obesity and brain structure in 700 MCI and AD patients. Organization for Human Brain Mapping, Barcelona, Spain, June 2010.
649. Stein J, Hua X, Lee S, Ho A, Leow A, Toga A, Saykin A, Shen L, Foroud T, Pankratz N, Huentelman M, Craig D, DeChairo B, Potkin S, Weiner M, Thompson P. Voxelwise Genome-Wide Association Study (vGWAS). Organization for Human Brain Mapping, Barcelona, Spain, June 2010.
650. Madsena SK, Hoa AJ, Hua X, Saharana PS, Toga AW, Jack CR, Weiner MW, Thompson PM and the Alzheimer's Disease Neuroimaging Initiative. Caudate Atrophy & Clinical Correlates in 400 Alzheimer's Disease, MCI, & Healthy Elderly Subjects. Organization for Human Brain Mapping, Barcelona, Spain, June 2010.
651. Schneider LS, Insel PS, Weiner MW, the Alzheimer's Disease Neuroimaging Initiative. Cholinesterase inhibitors and memantine use by patients in the Alzheimer's Disease Neuroimaging Initiative. International Congress on Alzheimer's Disease, Honolulu, HI, July 10-15, 2010.
652. Schuff N, Tosun D, Insel P, Chiang G, Truran-Sacrey D, Weiner MW. Nonlinear progression of brain volume loss with age and cognitive impairment. International Congress on Alzheimer's Disease, Honolulu, HI, July 10-15, 2010.
653. Tosun D, Insel P, Schuff N, Weiner MW. Classification Accuracy using Structural and Perfusion Weighted MRI in Alzheimer's Disease. International Congress on Alzheimer's Disease, Honolulu, HI, July 10-15, 2010.
654. Tosun D, Schuff N, Shaw LM, Trojanowski JQ, Weiner MW., Alzheimer's Disease Neuroimaging Initiative. Regional Variations in Brain Atrophy, CSF Biomarkers and ApoE Relations. International Congress on Alzheimer's Disease, Honolulu, HI, July 10-15, 2010.
655. Tosun D, Schuff N, Jagust W, Weiner MW, Alzheimer's Disease Neuroimaging Initiative. Relationship Between Regional Brain Amyloid-b Deposition and Brain Atrophy Rates in Mild Cognitive Impairment. International Congress on Alzheimer's Disease, Honolulu, HI, July 10-15, 2010.
656. Tosun D, Schuff N, Raptentsetsang S, Truran-Sacrey D, Shaw L, Trojanowski J, Weiner M. Associations Between Baseline Concentration of Alzheimer's Disease's Biochemical Markers and MRI Regional Rates of Brain Tissue Loss in ADNI Data. International Congress on Alzheimer's Disease, Honolulu, HI, July 10-15, 2010.
657. Chen K, Ayutyanont N, Langbaum J, Fleisher A, Reschke C, Lee W, Liu X, Alexander GE, Bandy D, Foster NL, Weiner MW, Koeppe RA, Thompson P, Jagust WJ, Reiman EM and the Alzheimer's Disease Neuroimaging Initiative. Use of an Alzheimer's Disease-Related Hypometabolic Convergence Index to Predict Progression from Mild Cognitive Impairment to

Curriculum Vitae - Michael W. Weiner, M.D.

Alzheimer's Dementia. International Congress on Alzheimer's Disease, Honolulu, HI, July 10-15, 2010.

658. Weiner MW, Aisen P, Petersen R, Jack C, Jagust W, Trojanowski J, Shaw L, Toga A, Beckett L, Gamst A. Biomarkers for monitoring the progression of Alzheimer's disease in clinical trials: the Alzheimer's Disease Neuroimaging Initiative. Alzheimer's Symposium: Latest Developments in Research, Diagnostics & Treatment, Emeryville, CA, August 19, 2010.
659. Tosun D, Weiner MW, Schuff N, Rosen H, Miller BL. Joint Independent Component Analysis of Brain Perfusion and Structural Magnetic Resonance Images in Dementia. 20th International Conference on Pattern Recognition, Istanbul, Turkey, August 23-26, 2010.
660. Weiner MW, Aisen P, Petersen R, Jack C, Jagust W, Trojanowski J, Shaw L, Toga A, Beckett L, Gamst A. Designing primary prevention trials using biomarker and clinical data from the Alzheimer's Disease Neuroimaging Initiative. Clinical Trials on Alzheimer's Disease, Toulouse, France, November 3-5, 2010.
661. Madsen SK, Saharan PS, Jack CR, Weiner MW, Toga AW, Thompson PM. Caudate atrophy & its clinical correlates in 400 Alzheimer's disease, MCI, & healthy elderly subjects. Proc. Society for Neuroscience, San Diego, CA, November 2010.
662. Rajagopalan P, Jahanshad N, Stein JL, Toga AW, Jack CR, Weiner MW, Thompson PM and the ADNI (2011). Commonly-carried variant in the folate pathway gene, MTHFR, may partly account for homocysteine related brain atrophy. Proc. Society for Neuroscience, November 12-16, 2011.
663. Hibar DP, Jason L. Stein, Omid Kohannim, Neda Jahanshad, Kori Johnson, Katie L. McMahon, Greig I. de Zubizaray, Grant W. Montgomery, Nicholas G. Martin, Margaret J. Wright, Andrew J. Saykin, Clifford R. Jack, Jr, Michael W. Weiner, Arthur W. Toga, Thompson PM and the Alzheimer's Disease Neuroimaging Initiative* (2011). Alzheimer risk gene, GAB2, is associated with brain atrophy in both young and old adults: Discovery and replication in N=1321 subjects using principal components regression, Proc. Society for Neuroscience, November 12-16, 2011.
664. Synder HM, Shineman D, Fillit H, Weiner MW, Carrillo M. Developing Novel Blood-Based Biomarkers for Alzheimer's Disease. *Alzheimer's & Dementia*. 10(1): 109-14, Jan 2014

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA

IN RE: NATIONAL FOOTBALL LEAGUE
PLAYERS' CONCUSSION INJURY
LITIGATION

Kevin Turner and Shawn Wooden,
*on behalf of themselves and
others similarly situated,*

Plaintiffs,

v.

National Football League and
NFL Properties, LLC,
successor-in-interest to
NFL Properties, Inc.,

Defendants.

THIS DOCUMENT RELATES TO:
ALL ACTIONS

DECLARATION OF JAMES R. STONE, MD, PhD

James R. Stone, MD, PhD affirms under penalty of perjury the truth of the following facts:

1. I am an Associate Professor of Radiology and Medical Imaging (primary), Neurological Surgery (secondary), and Co-director of the University of Virginia Brain Injury and Sports Concussion Institute. My *curriculum vitae* is attached as Exhibit A.

2. I have been asked to submit this declaration in support of the objection to the proposed class action settlement in the above captioned case filed by the MoloLamken LLP law firm. I am not being compensated for my work in doing so.

3. Chronic traumatic encephalopathy (or CTE) is a unique neurodegenerative disease that is known to exist outside of ALS, Alzheimer's disease, or Parkinson's disease.

4. Repetitive brain trauma is a necessary condition for developing CTE.

5. ALS, Alzheimer's disease, and Parkinson's disease are found in the general population of individuals who have not suffered repetitive brain trauma. Suicidality does not present as a symptom of these diseases.

6. Mood and behavioral impairments such as depression, suicidality, hopelessness, impulsivity, explosiveness, rage, and aggression, although present in the general population, appear more frequently in individuals suffering from CTE than in the general population.

7. The mood and behavioral impairments associated with CTE can present prior to the onset of CTE-related dementia and can be the cause of significant disability and distress for the patient.

8. Based on my experience and knowledge of the clinical and scientific literature, I believe that a reliable, valid, and clinically accepted diagnosis of CTE, based, in part, on objective biomarkers, will likely be possible in the next decade, if not sooner, and long before the 65-year term of the proposed NFL Concussion Litigation Settlement expires.

9. I am not aware of the use of the diagnostic or classification categories of "Neurocognitive Impairment Level 1.0," "Neurocognitive Impairment Level 1.5," or "Neurocognitive Impairment Level 2.0" anywhere in the medical or scientific community.

Pursuant to 28 U.S.C. § 1746, I state under penalty of perjury that the foregoing is true and correct.

Dated: November 25th, 2014

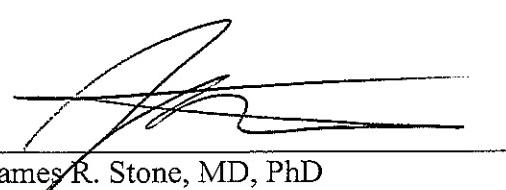

James R. Stone, MD, PhD

Exhibit A

Revised November 2014

CURRICULUM VITAE

James R. Stone, MD, PhD
Associate Professor
Radiology and Medical Imaging
University of Virginia Health System

Date of Birth: July 31st, 1972
Place of Birth: District of Columbia
Home Address: 1927 Ridgetop Drive
Charlottesville, VA 22903
Address: University of Virginia Health System
Division of Interventional Radiology
1215 Lee Street
Box 800170
Charlottesville, Virginia 22908

EDUCATION

2004	M.D.	School of Medicine University of Virginia Charlottesville, Virginia
2000	Ph.D.	Medical College of Virginia Virginia Commonwealth University Richmond, Virginia
1995	B.S	Virginia Commonwealth University Richmond, Virginia

Postdoctoral training:

2009 – 2010	Clinical fellowship: Interventional Radiology University of Virginia Health System Charlottesville, Virginia
2005 - 2009	Residency: Diagnostic Radiology University of Virginia Health System Charlottesville, Virginia
2004 - 2005	Intership: General Surgery

Revised November 2014

University of Virginia Health System
Charlottesville, Virginia

- 2000 - 2001 **Research fellowship: Neurological Surgery**
 Laboratory of Dr. Gregory Helm
 University of Virginia
 Charlottesville, Virginia
- 2000 **Research fellowship: Anatomy and Neurobiology**
 Laboratory of Dr. John Povlishock
 Medical College of Virginia
 Virginia Commonwealth University
 Richmond, Virginia

HOSPITAL STAFF APPOINTMENTS:

- 2010 – Present **Staff Interventional Radiologist**
 University of Virginia Health System
 Charlottesville, Virginia

ACADEMIC APPOINTMENTS:

- 2014 – Present **Associate Professor of Radiology and Medical Imaging (Primary)**
 Division of Interventional Radiology
 University of Virginia Health System
 Charlottesville, Virginia
- 2014 – Present **Associate Professor of Neurological Surgery (Secondary)**
 Department of Neurological Surgery
 University of Virginia Health System
 Charlottesville, Virginia
- 2010 – 2014 **Assistant Professor of Radiology and Medical Imaging (Primary)**
 Department of Neurological Surgery
 University of Virginia Health System
 Charlottesville, Virginia
- 2010 – 2014 **Assistant Professor of Neurological Surgery (Secondary)**
 Department of Neurological Surgery
 University of Virginia Health System

Revised November 2014

Charlottesville, Virginia

2003 – 2010	Research Assistant Professor of Neurological Surgery Department of Neurological Surgery University of Virginia Health System Charlottesville, Virginia
2001 – 2003	Research Instructor of Neurological Surgery Department of Neurological Surgery University of Virginia Health System Charlottesville, Virginia
1996 – 1998	Adjunct Instructor of Kinesiology College of William and Mary Williamsburg, Virginia

BOARD CERTIFICATION/LICENSURE

2012	Certificate of Advanced Qualification Vascular and Interventional Radiology American Board of Radiology
2010 – Present	United States DEA license
2009	Diagnostic Radiology American Board of Radiology
2008 – Present	Medicine and Surgery Commonwealth of Virginia

TEACHING EXPERIENCE

Lectures:

2011	Instructor: Advanced Research Design Course, School of Engineering and Applied Sciences University of Virginia
2010 – present	Interventional Radiology Fellows Case Conference (weekly)
2010 – present	Interventional Radiology Didactic Conference (quarterly)

Revised November 2014

2010 – present	Radiology Resident Case Conference (quarterly)
2010 – present	Radiology Resident Didactic Conference (quarterly)
2000	Teaching Assistant: School of Medicine - Gross Anatomy professional course. University of Virginia.
1997	Teaching Assistant: School of Dentistry - Histology professional course Medical College of Virginia
1996 – 1998	Adjunct Instructor: Human Anatomy Laboratory Department of Kinesiology, College of William and Mary
1996	Teaching Assistant: School of Pharmacy - Gross Anatomy, Histology, Neuroscience professional courses. Medical College of Virginia.
1996	Teaching Assistant: School of Medicine - Gross Anatomy professional course. Medical College of Virginia.

Mentorships:Interventional Radiology Fellows Trained

2014-2015	Jamie Ali, MD, Andrew Ferdinand, MD, Nicholas Hendricks, MD, Andre Uflacker, MD, Jonathan West, MD
2013-2014	Bill Brehmer, MD, Minhajuddin Khaja, MD, Matthew Bernhard, MD, Ryan Gossage, MD, Ted Chang, MD
2012-2013	Peter Simon, MD, Curtis Anderson, MD, PhD, Sean Lyman, MD, PhD, Christina Meade, MD, Heath McCullough, MD
2011-2012	Sean Kalagher, MD, Christopher Porter, MD, R. Steve Young, MD, Charles Wehbe, MD, Jamil Muasher, MD
2010-2011	Charles Gilliland, MD, Gregory Frey, MD, Robert Short, MD, Joshua Hubbard, MD, Harun Ozer, MD

Vascular Surgery Fellows Trained

2014-2015	Tonya Flohr, MD
2013-2014	Amit Jain, MD
2012-2013	Joshua Adams, MD
2011-2012	Alvaro Zamora, MD
2010-2011	Michael Meulbeger, MD

Student/Resident/Post-doctoral fellow mentorships

2014	Christian Salinas, Radiology Resident
2014	Andre Uflacker, Radiology Resident
2013	Alex Monroe, Medical Student

Revised November 2014

2013	Jamie Doster, Radiology Resident
2011 - 2012	Lauren Becker, Undergraduate Student
2011	Leen Jamal, Undergraduate Student
2011	Dalia Deak, Undergraduate Student
2011	Hannah Meredith, Undergraduate Student
2011	Byong Kang, Undergraduate Student
2011	Shawna Kleban, Medical Student
2011	Sarah Jeffrey, Undergraduate Student
2010 – 2011	Jing Chen, MD, Postdoctoral Fellow
2010 – 2011	Brad Billowus, Undergraduate Student
2010	Nate Coddington, Undergraduate Student
2010	Wael Darwish, MD, Postdoctoral Fellow
2008 – 2009	Tianli Lu, Medical Student
2005	Maria Alexandrescu, Medical Student
2004 – 2005	Sebastian Zavoian, Postdoctoral Fellow
2003 – 2004	Dong Kim, Undergraduate Student
2003 – 2004	Andrew Hawkins, Undergraduate Student
2003	Evelyn Boatwright, Undergraduate Student
2002	Katherine Turner, Undergraduate Student
2002 – 2004	James Mills, MD, Postdoctoral Fellow
2001 – 2003	David Rubin, Undergraduate Student
2001 – 2003	David Melon, Undergraduate Student
2001 – 2003	Jaime Wagner, Undergraduate Student
2001 – 2002	Leman Mutlu, MD, Postdoctoral Fellow
2001	Anthony Marmarou, Undergraduate Student
2001	Reena Shial, Undergraduate Student
2001	Alfa Diallo, Medical Student

HONORS/AWARDS

2008 – 2009	Resident Research Award, Department of Radiology University of Virginia
2007 – 2008	Resident Research Award, Department of Radiology University of Virginia
2003 – 2004	Society of the Cincinnati Scholarship Recipient
2002	Finalist, Poster competition, 1 st Joint Symposium National-International Neurotrauma Societies Tampa, Florida
2002	Most outstanding research, selected for open communication lecture 1 st Joint Symposium, National-International Neurotrauma Societies Tampa, Florida
2002	Visiting Professor, University of Pennsylvania Head Injury Center Philadelphia, Pennsylvania
2001 – 2004	Joseph Collins Scholarship
2000	Most outstanding research, selected for open communication lecture National Neurotrauma Society, 19 th Annual meeting New Orleans, Louisiana
2000	Finalist, Poster competition, 5 th International Neurotrauma Symposium Garmisch, Germany

Revised November 2014

1998	Finalist, John C. Forbes Graduate Research Competition
1998	First Place, National Neurotrauma Society Graduate Student Poster Competition, Los Angeles, California
1997 – 1998	C.C. Clayton Fellowship
1996 – 2000	Commonwealth Graduate Fellowship, State Council for Higher Education in Virginia

ACADEMIC ORGANIZATIONS

- 2014-present Co-Chair, US Army Medical Research Materiel Command, Combat Casualty Care Research Program, Neuroimaging of Traumatic Brain Injury Working Group.
- 2014-present Chair, American College of Radiology Head Injury Institute, Research to Practice Committee
- 2014-present Co-director, University of Virginia Brain Injury and Sports Concussion Institute.
- 2013 Chair, American College of Radiology Head Injury Institute, Information Technology Committee
- 2013 Member, American College of Radiology Head Injury Institute, Science Committee
- 2013 UVA LCME Institutional Setting subcommittee
- 2013 Health System Clinical Research Program – Cardiovascular Section Grant Review Committee Member
- 2012 UVA Faculty Senate Cross Grounds Synergies Task Force – Co-director
- 2012 UVA Faculty Senate Online Learning Task Force – Member
- 2011- present US Army MRMC Military Operational Medicine, Research Area III Directorate, mild traumatic brain injury steering committee. External Reviewer.
- 2011- present American Institute of Biological Sciences. External Reviewer.
- 2011 Faculty search committee, Molecular Imaging Recruitment Research Division, University of Virginia Department of Radiology
- 2011-present Society of Interventional Radiology Standards of Practice Committee
- 2011 International Research Council on Biomechanics of Injury. External

Revised November 2014

Reviewer.

- 2010 – 2011 Founding member, University of Virginia Brain Injury Consortium
- 1998 – 2000 Graduate Admissions Committee
Department of Anatomy and Neurobiology
Medical College of Virginia, Virginia Commonwealth University
- 1998 Faculty Promotions Committee – Dr. J. Ross McClung

CLINICAL SKILLS

- Endovascular management of peripheral vascular disease (PTA, stent, laser/mechanical atherectomy, subintimal recanalization, SAFARI, utilization of re-entry devices). Includes management of infrapopliteal disease.
- Endovascular therapy for renal artery stenosis
- Endovascular management of acute and chronic mesenteric ischemia
- Stent graft placement for management of acute and chronic thoracic and abdominal aortic disease.
- Percutaneous management of endoleaks following aortic stent graft placement.
- Percutaneous management of peripheral arterial aneurysms and pseudoaneurysms.
- Liver transplant interventions.
- Management of arterial hemoptysis
- Treatment of upper and lower GI hemorrhage
- Treatment of trauma-related hemorrhage
- Radioembolization for treatment of primary and metastatic hepatic malignancy
- Chemoembolization for treatment of primary hepatic malignancy
- Embolization for treatment of metastatic neuroendocrine hepatic disease
- Portal vein embolization
- Renal artery embolization for primary treatment of angiomyolipoma or devascularization prior to surgical nephrectomy.
- Transvenous renal biopsy
- Transjugular intrahepatic portosystemic shunt (TIPS) for management of symptomatic portal hypertension
- Balloon Retrograde Transvenous Occlusion (BRTO) for treatment of gastric varices
- Percutaneous treatment of biliary obstruction or leak
- Percutaneous management of calculous and acalculous cholecystitis
- Percutaneous management of urinary obstruction
- Endovascular therapy for uterine fibroid disease
- Placement and retrieval of inferior vena cava (IVC) filters for prevention of pulmonary embolism
- Management of acute and chronic venous occlusive disease
- Endovascular management of pulmonary embolism using mechanical thrombectomy and thrombolysis.
- Dialysis Fistula/Graft management
- Placement of tunneled or non-tunneled central venous catheters
- Port-a-cath placement

Revised November 2014

CLINICAL RESEARCH STUDIES

Principal Investigator

Title: VenaTech(TM) Convertible(TM) Vena Cava Filter U.S. Multi-Center Clinical Trial

Role: Principal Investigator

Status: Closed to enrollment

Title: A Phase III Clinical Trial of Intra-arterial TheraSphere in the Treatment of Patients with Unresectable Hepatocellular Carcinoma (HCC)

Role: Principal Investigator

Status: Open to enrollment

Title: Prospective Randomized Study of Chemoembolization Versus Radioembolization for the Treatment of Hepatocellular Carcinoma (PREMIERE) Trial.

Role: Co-Principal Investigator

Status: Protocol under review

Title: Retrospective Identification of Abdominal Aortic Aneurysm Patients that Have Undergone Computed Tomography and Positron Emission Tomography Imaging

Role: Principal Investigator

Status: Open to enrollment

Title: Retrospective Assessment of Y90 administration for treatment of hepatocellular carcinoma using positron emission tomography (PET).

Role: Principal Investigator

Status: Open to enrollment

Title: Breacher Injury Study: Evaluation of the Bio-Effects of Repeated, Low-Level Blast Exposures

Role: Principal Investigator

Status: Closed to enrollment, Performing Data Analysis

Title: Breacher Injury Study II: Re-Evaluation of the Bio-Effects of Repeated, Low-Level Blast Exposure

Role: Principal Investigator

Status: Temporarily closed to enrollment

Title: Brain Injury Biomarkers and Behavioral Characterization of mTBI in Soldiers Following Repeated, Low-Level Blast Exposure

Role: Principal Investigator

Status: Open to enrollment

Sub-Investigator

Revised November 2014

Title: The use of Endovascular Stents in the Thoracic Aorta at the University of Virginia

Role: Sub-investigator

Status: Open to enrollment

Title: Off-line analysis of color-coded blood flow angiography

Role: Sub-Investigator

Status: Open to enrollment

Title: Acute Venous Thrombosis: Thrombus Removal With Adjunctive Catheter-Directed Thrombolysis (The ATTRACT Trial)

Role: Sub-investigator

Status: Open to enrollment

Title: Evaluation of the GORE Conformable TAG Thoracic Endoprosthesis for Treatment of Acute Complicated Type B Aortic Dissection: TAG 08-01

Role: Sub-investigator

Status: Closed to enrollment, follow-up only

Title: Prospective, Multicenter, Randomized Controlled Trial of Endovascular Aneurysm Repair Using a Bilateral Percutaneous Approach (PEVAR) vs. Standard Approach (SEVAR) Using the IntuiTrak Endovascular AAA Delivery System

Role: Sub-investigator

Status: Closed to enrollment, follow-up only

Title: Zenith TX2 TAA Endovascular Graft Post-Approval Study

Role: Sub-investigator

Status: Open to enrollment

Title: CRUX Biomedical Evaluation of the Crux Inferior Vena Cava Filter System 2 - ("RETRIEVE2")

Role: Sub-investigator

Status: Closed to enrollment, follow-up only

Title: A Phase IV Clinical Study to Evaluate the Safety of MR-Guided Focused Ultrasound Treatment of Uterine Fibroids With Enhanced Sonication Techniques

Role: Sub-investigator

Status: Open to enrollment

Title: Patient Long-Term Follow-Up to Collect Data Following MR-Guided Focused Ultrasound Treatment of Uterine Fibroids with Enhanced Sonication Techniques

Role: Sub-investigator

Status: Open to enrollment

Title: Clinical Study to Evaluate the Safety and Effectiveness of the Zenith Branch Endovascular Graft-Iliac Bifurcation with the ConnectSX

Revised November 2014

Role: Sub-investigator

Status: Open to enrollment

Title: Post Approval Study Evaluating the Long Term Safety and Effectiveness of the Endurant Stent Graft System (ENGAGE PAS)

Role: Sub-investigator

Status: Open to enrollment

Title: A Clinical Study to Evaluate Safety of the ExAblate Model 2100 Type 1.1 System (ExAblate 2100/2200 UF V2 System) in the Treatment of Symptomatic Uterine Fibroids

Role: Sub-investigator

Status: Open to enrollment

Title: Patient Long-Term Follow-Up To Collect Data Following MR-Guided Focused Ultrasound Treatment of Uterine Fibroids With ExAblate Model 2100 Type 1.1 System

Role: Sub-investigator

Status: Open to enrollment

Title: Randomized Trial of IN.PACT(Paclitaxel) Admiral Drug-Eluting Balloon (DEB) vs Standard PTA for the Treatment of Atherosclerotic Lesions in the Superficial Femoral Artery (SFA) and/or Proximal Popliteal Artery (PPA) ("SFA II")

Role: Sub-investigator

Status: Open to enrollment

Title: Zenith TX2 Low Profile Endovascular Graft for Blunt Thoracic Aortic Injury Clinical Study

Role: Sub-investigator

Status: Open to enrollment

Title: A Randomized, Multicenter, Double-Blind, Placebo-Controlled Study of AC607 for the Treatment of Acute Kidney Injury in Cardiac Surgery Subjects

Role: Sub-investigator

Status: Open to enrollment

Title: Use of the Zenith Dissection Endovascular System in the Treatment of Patients with Acute, Complicated Type B Aortic Dissection.

Role: Sub-investigator

Status: Open to enrollment

PAST AND PRESENT FUNDING

Sponsor: General Electric

Title: PET imaging of inflammation in a rodent TBI model

Role: Principal Investigator

Period: 11/1/14 – 12/31/15

Amount: \$108,290

Revised November 2014

Sponsor: US Army Medical Research and Materiel Command
Title: Functional and structural changes in cerebral vasculature following exposure to blast overpressures associated with TBI in military personnel
Role: Co-Principal Investigator
Period: 12/1/2014 – 9/30/2017
Amount: \$1,073,569

Sponsor: US Army Medical Research and Materiel Command
Title: Developing occupational standards for blast exposure.
Role: Principal Investigator
Period: 12/1/2014 – 9/30/2019
Amount: \$1,500,005

Sponsor: US Navy Bureau of Medicine
Title: Neuroimaging correlates of low-level blast exposure in experience military breachers
Role: Principal Investigator
Period: 9/1/2012 – 5/30/2015
Amount: \$343,659

Sponsor: US Army Medical Research and Materiel Command
Title: Brain Injury Biomarkers and Behavioral Characterization of mTBI in Soldiers Following Repeated, Low-Level Blast Exposure
Role: Principal Investigator
Period: 6/1/2009 – 5/30/2015
Amount: \$1,261,014

Sponsor: US Army Medical Research and Materiel Command
Title: Toward development of a field-deployable imaging device for TBI
Role: Principal Investigator
Period: 2/7/2011 – 2/06/2015
Amount: \$1,052,400

Sponsor: DARPA
Title: Re-evaluation of the Bio-Effects of Repeated, Low-Level Blast Exposures
Role: Principal Investigator
Period: 7/1/2009 – 8/31/2014
Amount: \$681,525

Sponsor: Sirtex Medical, Ltd.
Title: The QUEST trial: Site Assessment Study
Role: Principal Investigator
Period: 7/1/2013 – 6/30/2014
Amount: \$8,164

Revised November 2014

Sponsor: Society of Interventional Radiology/Society of Vascular Surgery
Title: Predicting the Safety and Effectiveness of Inferior Vena Cava Filters (PRESERVE) trial
Role: Core Lab Principal Investigator
Period: TBD – 5 yr period of performance
Amount: \$980,000

Sponsor: B. Braun Interventional Systems
Title: VenaTech(TM) Convertible(TM) Vena Cava Filter U.S. Multi-Center Clinical Trial
Role: Principal Investigator
Period: 5/1/2012 – 4/30/2015
Amount: \$260,121

Sponsor: US Army Medical Research and Materiel Command
Title: Neuroimaging of biomarkers for combat relevant Traumatic Brain Injury
Role: Co-Principal Investigator
Period: 7/1/2009 – 9/30/2013
Amount: \$4,291,303

Sponsor: Office of Naval Research
Title: Histopathology of Experimental Blast Induced TBI
Role: Principal Investigator
Period: 1/1/2009 – 12/31/2009
Amount: \$44,133

Sponsor: SIR Foundation
Title: Preclinical evaluation of systemic Sorafenib (Nexavar) administration following trans-arterial chemoembolization (TACE) in a rodent model of hepatocellular carcinoma (HCC).
Role: Principal Investigator
Period: 6/1/2008 – 6/1/2009
Amount: \$25,000

Sponsor: Office of Naval Research (ONR)
Title: Breacher Injury Study
Role: Co-Principal Investigator
Period: 12/13/2007 – 12/31/2008
Amount: \$405,000

Sponsor: Department of Defense (DARPA)
Title: Physiologic Response to Blast in the Protected Subject
Role: Co-Principal Investigator
Period: 7/1/2005 to 6/30/2006
Amount: \$105,000

Sponsor: Commonwealth Neurotrauma Initiative
Title: Secondary Injury Mechanisms in Traumatic Brain Injury
Role: Co-Principal Investigator
Period: 2/1/2002 to 1/31/2004
Amount: \$450,000

Revised November 2014

Sponsor: Commonwealth Neurotrauma Initiative
 Title: Novel Therapeutic Interventions in Traumatic Brain Injury
 Role: Collaborator
 Period: 2/1/2002 to 1/31/2004
 Amount: \$258,000

Sponsor: Alzheimer's Association
 Title: Alzheimer's-Associated Beta-Amyloid Peptide and Traumatic Brain Injury: mechanisms of formation and therapeutic intervention.
 Role: Co-Principal Investigator
 Period: 9/1/2001 to 8/31/2003
 Amount: \$79,000

LECTURES/PRESENTATIONS

- 2014 Blast Occupational Standards Program. General Electric Global Research TBI symposium.
- 2014 Neuroimaging of traumatic brain injury. Health Occupation Students of America Virginia Commonwealth Annual Meeting.
- 2014 Positron emission tomography (PET) imaging of traumatic brain injury. Practical PET Imaging for Clinicians and Biologists for Research and Patient Management.
- 2014 Neuroimaging of biomarkers for combat relevant traumatic brain injury. Fort Campbell National Intrepid Center of Excellent TBI Symposium.
- 2014 Neuroimaging of biomarkers for combat relevant traumatic brain injury. Fort Detrick Combat Casualty Care Research Program, Interim Program Review.
- 2013 Use of *syngo* iFlow to assess dynamic flow during vascular interventional procedures. World Congress of Interventional Oncology 2013 meeting. Siemens session.
- 2013 *Syngo* DynaCT applications in interventional radiology. World Congress of Interventional Oncology 2013 meeting. Siemens session.
- 2013 Angiosome-directed lower extremity revascularization for treatment of ischemic ulcer disease. Podiatry clinical outreach seminar.
- 2013 Advanced neuroimaging tools for detection of traumatic brain injury. Grand Rounds. Department of Neurological Surgery. University of Washington.
- 2012 UVA Neurotrauma laboratory research update, Department of Neurological Surgery, University of Virginia, Research Conference
- 2012 Neuroimaging correlates of repetitive blast exposure in human military service members. Dean's new faculty seminar series. University of Virginia.

Revised November 2014

- 2011 Long Term Sequelae of Combat Relevant Traumatic Brain Injury, Neurotrauma Grand Rounds, Medical Research and Materiel Command, Fort Detrick, Frederick, MD
- 2011 Neuroimaging of Biomarkers for Combat Relevant Traumatic Brain Injury, Interim Project Review, Medical Research and Materiel Command, Herndon, VA
- 2011 Neuroimaging correlates of repetitive low-level blast exposure in human military breachers. Virginia Commonwealth University Traumatic Brain Injury Spring Seminar Series
- 2010 Neuroimaging of low-level blast exposure in US Marine Corp Breachers. Department of Psychology, University of Virginia, Research Conference
- 2010 Neuroimaging correlates of repetitive low-level blast in US Marine Corp Breacher Instructors and Trainees, Department of Radiology, Keynote lecture, Annual Research Week
- 2010 Research update, Virginia Neurotrauma Laboratory, Department of Neurological Surgery, University of Virginia, Research Conference
- 2010 Kiwi Breacher Study, Neuroimaging Update, Walter Reed Army Institute of Research
- 2010 Neuroimaging correlates of blast exposure in a small animal experimental overpressure model and in human military breachers. Advanced Technology Applications for Combat Casualty Care, St. Pete Beach
- 2008 Breacher Injury Study. Office of Naval Research Investigators Meeting
- 2007 Microstructural damage in traumatic blast injury, DARPA update on blast research conference (2007)
- 2007 Neuroimaging and toxicological evaluations following repeated low-level blast exposure. DARPA PREVENT kick-off meeting, New York, NY (2007)
- 2007 Magnetic Resonance Imaging as a diagnostic and research tool in blast-induced Traumatic Brain Injury, Technical Support Working Group (2007)
- 2007 Neuroimaging evaluation of breacher trainees following repeated low-level blast exposure, Applied Research Associates, update on research meeting (2007)
- 2007 Traumatic Axonal Injury: Elucidation of Injury mechanisms and identification of targets for therapeutic intervention. W.M. Keck Center for Cellular Imaging, FRET Microscopy Workshop, University of Virginia (2007)
- 2006 Development of Biologically Meaningful Blast Injury Criteria, Technical Support Working Group (2006)

Revised November 2014

- 2005 Utilization of Tissue FRET to Explore Role of Bcl-2-related Proteins in Traumatic Axonal Injury Following Traumatic Brain Injury. W.M. Keck Center for Cellular Imaging FRET workshop.
- 2005 Brain Injury from Blast – Preliminary Results, DARPA update on blast research conference.
- 2005 Neuropathology of blast-induced traumatic brain injury, Walter Reed Army Medical Center, Defense and Veterans Brain Injury Center (2005)
- 2004 Mechanisms of Traumatic Axonal Injury Pathogenesis. Commonwealth Neurotrauma Initiative Investigators Meeting.
- 2002 Relationship of 40kD, 10kD, and 3kD fluorescent indicators of altered axolemmal permeability to impaired axonal transport in Traumatic Axonal Injury. National Neurotrauma Society Annual Meeting.
- 2002 Characterization of the heterogeneous axonal response to Traumatic Brain Injury. University of Pennsylvania Head Injury Center Grand Rounds.
- 2001 Caspase-3 cleavage of Amyloid Precursor Protein and Deposition of A β peptide in TBI: A mechanism for axonal death? European Neurocritical Care Conference, Innsbruck, Austria.
- 1999 Immunolocalization of impaired axonal transport and neurofilament disruption in traumatic axonal injury. Virginia Commonwealth University Neurotrauma Fall Seminar.
- 1999 Immunofluorescent co-localization of Amyloid Precursor Protein and RM014 within distinct classes of Traumatically Injured Axons. Society for Neurosciences Annual Meeting.

EDITORIAL ACTIVITIES

- Journal of Vascular and Interventional Radiology, Manuscript Reviewer
- Experimental Neurology, Manuscript Reviewer
- Journal of Neuroscience Methods, Manuscript Reviewer
- Journal of Neurotrauma, Manuscript Reviewer
- Neuroimage, Manuscript Reviewer
- Neurosurgery, Manuscript Reviewer
- New England Journal of Medicine, Manuscript Reviewer
- Journal of Clinical Investigation, Manuscript Reviewer
- Science Translational Medicine, Manuscript Reviewer
- Cardiovascular and Interventional Radiology, Manuscript Reviewer
- JAMA Neurology (Formerly the Archives of Neurology), Manuscript Reviewer

BIBLIOGRAPHY

Publications:

1. Banizs AB, Huang T, Dryden K, Berr SS, **Stone JR**, Nakamoto RK, He J. *In vitro* evaluation of endothelial exosomes as carriers for siRNA delivery. *Int J Nanomedicine* (2014) 9:4223-30
2. Tustison NJ, Cook PA, Klein A, Song G, Sandhitsu DR, Duda JT, Kandel BM, Strien NV, **Stone JR**, Gee JC, Avants BB. Large-Scale Evaluations of ANTs and FreeSurfer Cortical Thickness Measurements. *Neuroimage* (2014). 99:166-79
3. Tustison NJ, Avants BB, Cook PA, Kim J, Whyte J, Gee JC, **Stone JR**: Logical Circularity in Voxel-Based Analysis: normalization strategy may induce statistical bias, *Hum Brain Mapp.* (2014) 35(3):745-59
4. Gandy S, Ikonomovic MD, Mitsis E, Elder G, Ahlers ST, Barth J, **Stone JR**, DeKosky ST. Chronic Traumatic Encephalopathy: Clinical-Biomarker Correlations and Current Concepts in Pathogenesis. *Mol Neurodegen.* (2014). 9:37.
5. Rueb GR, Brady WJ, Gilliland CA, Patrie JT, Saad WE, Sabri SS, Park AW, **Stone JR**, Angle JF. Characterizing Cardiopulmonary Arrest during Interventional Radiology Procedures. *J Vasc Interv Radiol.* (2013) 24(12):1774-8.
6. Gabler LF, **Stone JR**, Mourad PD, Crandall JR, Salzar RS, Region Specific Viscoelastic Properties of the Adult Rat Brain under Indentation following Traumatic Brain Injury, *Proc Ircobi Conf.* (2013) paper no. IRC-13-52, pp. 470- 482.
7. Choudhri AF, Norton PT, Carr TM, **Stone JR**, Hagspiel KD, Dake MD. Diagnosis and Treatment Planning of Acute Aortic Emergencies Using a Handheld DICOM Viewer. *Emergency Radiology.* (2013) 20(4):267-72.
8. Saad WE, Kalagher S, Turba UC, Sabri SS, Park AW, **Stone J**, Angle JF, Matsumoto AH. Ureteric Embolization for Lower Urinary Tract Fistulae: Use of Two Amplatzer Vascular Plugs and N-Butyl Cyanoacrylate Employing the "Sandwich" Technique. *Cardiovasc Interv Radiol.* (2012) 36(4):1068-72.
9. Choudhri AF, Carr TM, Ho CP, **Stone JR**, Gay SB, Lambert DL. Handheld Device Review of Abdominal CT for the Evaluation of Acute Appendicitis. *J Digit Imaging.* (2012) 25(4):492-6.
10. Ahlers ST, Vasserman-Stokes E, Shaughness MC, Hall AA, Shear DA, Chavko M, McCarron MR, **Stone JR**. Assessment of the Effects of Acute and Repeated Exposure to Blast Overpressure in Rodents: Towards a Greater Understanding of Blast and the Potential Ramifications for Injury in Humans Exposed to Blast. *Frontiers in Neurotrauma.* (2012) 3:32.
11. Tustison NJ, Cook PA, Avants BB, **Stone JR**. Simulated Diffusion-Weighted Imaging for the ITK Masses, *Insight Journal* (2011), <http://hdl.handle.net/10380/3315>.

Revised November 2014

12. Shafieian M, Darvish KK, **Stone JR**. Changes to the Viscoelastic Properties of Brain Tissue after Traumatic Axonal Injury. *J. Biomechanics*. (2009) 18;42(13):2136-42.
13. **Stone JR**, Evans AJ, Angle JF, Arslan B, Turba UC, Matsumoto AH. In vitro assessment of aortic stent-graft integrity following exposure to Onyx liquid embolic agent. *J Vasc Interv Radiol*. (2009) 20(1):107-12.
14. Okonkwo DO, Reece TB, Laurent JJ, Hawkins AS, Ellman PI, Linden J, Kron IL, Tribble CG, **Stone JR**, Kern JA. A comparison of adenosine A2A agonism and methylprednisolone in attenuating neuronal damage and improving functional outcome after experimental traumatic spinal cord injury in rabbits. *J. Neurosurg Spine* (2006) 1(4);64-70.
15. Hagspiel KD, **Stone JR**, Leung DA. Renal angioplasty and stent placement with distal protection: preliminary experience with the FilterWire EX. *J Vasc Interv Radiol*. (2005) 16(1);125-31.
16. **Stone JR**, Okonkwo DO, Dialo AO, Rubin DG, Mutlu LK, Povlishock JT, Helm GA. Impaired axonal transport and altered axolemmal permeability occur in distinct populations of damaged axons following traumatic brain injury. *Exp Neuro* (2004) 190: 59-69.
17. Okonkwo, D.O., Wagner, J., Melon, D.E., Alden, T., **Stone, J.R.**, Helm, G.A., Jane, J.A. Sr., Trans-sodium crocetinate Increases oxygen delivery to brain parenchyma in rats on oxygen supplementation. *Neurosci Lett*. (2003) 352(2): 97-100.
18. Mills, J.D., **Stone, J.R.**, Rubin, D.G., Melon, D.E., Okonkwo, D.O., Periasamy, A.P., Helm, G.A. Illuminating protein interactions in tissue using confocal and two-photon excitation fluorescent resonance energy transfer. *J. Biomedical Optics* (2003) 8(3), 347-356.
19. Okonkwo, D.O., Melon, D.E., Pellicane, A.J., Mutlu, L.K., Rubin, D.G., **Stone, J.R.**, Helm, G.A. Dose-response of cyclosporine A in attenuating traumatic axonal injury in rat. *Neuroreport* (2003) 3;14(3):463-6.
20. **Stone, J.R.**, Okonkwo, D.O., Singleton, R.H., Mutlu, L., Helm, G.A., and Povlishock, J.T. Caspase-3 mediated cleavage of the amyloid precursor protein and formation of the amyloid beta peptide in traumatic axonal injury. *J. Neurotrauma* (2002) 19(5):601-14.
21. Singleton, R.H., Zhu, J., **Stone, J.R.**, and Povlishock, J.T. Traumatically induced axotomy adjacent to the soma does not result in acute neuronal death. *J. Neuroscience* (2002) 1;22(3):791-802.
22. Suehiro, E., Singleton, R.H., **Stone, J.R.**, and Povlishock, J.T. The immunophilin ligand FK506 attenuates the axonal damage associated with rapid rewarming following post-traumatic hypothermia. *Exp Neurol*. (2001) 172(1):199-210.
23. **Stone, J.R.**, Singleton, R.H., and Povlishock, J.T. Intra-axonal neurofilament damage does not evoke local axonal swelling in all traumatically injured axons. *Exp. Neurol.* (2001) 172(2):320-31.
24. Singleton, R.H., **Stone, J.R.**, Okonkwo, D.O., and Povlishock, J.T. The immunophilin ligand FK506 attenuates axonal injury in an impact-acceleration model of traumatic brain injury. *J.*

Revised November 2014

Neurotrauma (2001) 18(6):607-14.

25. **Stone, J.R.**, Singleton, R.H., and Povlishock, J.T. Antibodies to the C-terminus of the β -Amyloid Precursor Protein (APP): A Site Specific Marker for the Detection of Traumatic Axonal Injury. *Brain Res.* (2000) 871(2):288-302.
26. Buki, A., Walker, S.A., **Stone, J.R.**, and Povlishock, J.T. Novel Application of Tyramide Signal Amplification (TSA): Ultrastructural Visualization of Double-Labeled Immunofluorescent Axonal Profiles. *J. Histochem Cytochem.* (2000) 48(1): 153-161.
27. **Stone, J.R.**, Walker, S.A., and Povlishock, J.T. The Visualization of a New Class of Traumatically Injured Axons through the use of a Modified Method of Microwave Antigen Retrieval. *Acta Neuropathol.* (1999) 97:335-345.
28. Povlishock, J.T., Buki, A., Koizumi, H., **Stone, J.R.**, and Okonkwo, D.O. Initiating Mechanisms Involved in the Pathobiology of Traumatically Induced Axonal Injury and Interventions Targeted at Blunting Their Progression. *Acta Neurochir [Suppl]* (1999) 73:15-20.

Book Chapters

1. Stone JR, Turba UC, Sabri SS, Saad WE, Angle JF, Matsumoto AH. (2013) Diagnosis and Management of Mesenteric Ischemia. Abrams Angiograph: Interventional Radiology. *In Press*.
2. Mills, J.D., Stone, J.R., Okonkwo, D.O., Periasamy, A. (2005) Multiphoton FRET microscopy for Protein Localization in Tissue, In: Molecular Imaging: FRET Microscopy and Spectroscopy. Periasamy A, editor, New York, NY: Oxford University Press.
3. Okonkwo, D.O. and Stone, J.R. (2003) Basic Science of Closed Head and Spinal Cord Injuries. In, Clinics in Sports Medicine: Head and Neck Injuries in Sports Medicine, Anderson DG and Helm GA, eds.
4. Povlishock, J.T. and Stone, J.R. (2001) Traumatic Axonal Injury. In: Head Trauma. Miller L.P., Hayes R.L., and Newcomb, J.K., editors. New York, NY: John Wiley & Sons, Inc.

Abstracts

1. Stone JR, He J, Huang T, Lankford M, Nelson L, Berr SS, Ahlers ST. Neuroimaging of apoptosis and caspase-3 activity in experimental traumatic brain injury (TBI) using positron emission tomography (PET) imaging ligands. *Military Health System Research Symposium, 2014*.
2. Carr W, LoPresti ML, Kamimori G, Stone JR, Tate, CM, Polejaeva E, Young LA, Walilko T, da Silva U, Yarnell A, Wassermann EM, McCarron RM. Repeated Low Level Blast Exposure: Human Subjects Studies. *Military Health System Research Symposium, 2014*.
3. Ugas M, Wilkins LR, **Stone JR**, Sabri SS, Haskal ZJ, Angle JF. Rates of complication and embolic capture utilizing the NAV-6 embolic protection system during arterial interventions involving the lower extremity. *Society of Interventional Radiology Annual Meeting, 2014*.

Revised November 2014

4. Contrella B, Sabri SS, **Stone JR**, Tracci MC, Kern JA, Upchurch GR, Matsumoto AH, Angle JF. Outcomes of coverage of the left subclavian artery during endovascular repair of the thoracic aorta. *Society of Interventional Radiology Annual Meeting*, 2014.
5. Hendricks N, Sabri SS, **Stone JR**, Tracci MC, Matsumoto AH, Angle JF. Limb salvage using pedal access for lower extremity arterial revascularization. *Society of Interventional Radiology Annual Meeting*, 2014.
6. Uflacker A, Sabri SS, Tracci MC, **Stone JR**, Angle JF. Aortic infectious disease: an emerging treatment paradigm. *Society of Interventional Radiology Annual Meeting*, 2014.
7. Doster J, Angle JF, **Stone JR**, Haskal ZJ, Park AW, Wilkins LR, Matsumoto AH, Sabri SS. Technique and tools needed for successful balloon-occluded retrograde transvenous obliteration (BRTO). *Society of Interventional Radiology Annual Meeting*, 2014.
8. Hendricks N, Angle JF, **Stone JR**, Park AW, Matsumoto AH, Cherry KJ, Sabri SS. Angiographic evaluation of high performance athletes with endofibrosis. *Society of Interventional Radiology Annual Meeting*, 2014.
9. Wong S, Cristescu M, Angle JF, Haskal ZJ, **Stone JR**, Wilkins LR, Sabri SS. Diagnosis and treatment of isolated splenic vein thrombosis. *Society of Interventional Radiology Annual Meeting*, 2014.
10. Carr W, LoPresti ML, Kamimori GH, **Stone JR**, Tate CM, Polejaeva E, Young LA, Walliko T, da Silva U, Yarnell A, Wasserman EM, McCarron RM. Repeated Low-Level Blast Exposure: Human Subjects Studies. *National Capital Area Traumatic Brain Injury Conference*, 2014.
11. Knutson K, Polejaeva E, LoPresti M, Carr W, Tierney M, **Stone JR**, Wasserman E, fMRI Evaluation of the Effects of Chronic Exposure to Low-Level Blast. *Organization for Human Brain Mapping, 13th Annual Meeting*, 2013.
12. Lafond S, Sabri SS, Stone JR, Saad WE, Angle JF. Nanoknife treatment of residual or recurrent hepatocellular carcinoma post locoregional therapy. *Society of Interventional Radiology 2013 Annual Meeting*.
13. West JK, Park A, Stone JR, Rea K, Cage DL, Saad WE, Sabri SS, Matsumoto AH. Evaluation of the safety and short-term clinical outcomes in the treatment of uterine fibroids with MR-guided focused ultrasound. *Society of Interventional Radiology 2013 Annual Meeting*.
14. Bernhard MR, Sabri SS, Stone JR, An elective hybrid suite approach to the management of placenta accrete postpartum hemorrhage (PPH). *Society of Interventional Radiology 2013 Annual Meeting*.
15. Stone JR, Sabri SS, Saad WE, Anderson CL, Nicholson D, Angle JF Towards design of a field-deployable aortic occlusion balloon device for control of pelvic hemorrhage. *Military Health System Research Symposium Annual meeting 2013*.
16. Stone JR, Pan D, Berr SS, Zhang Y, He J, Huang T, Lankford M, Nelson L, Ahlers ST. Neuroimaging of inflammation in experimental traumatic brain injury (TBI) using a positron emission tomography (PET) ligand targeting infiltrating neutrophils. *Military Health System Research Symposium Annual meeting 2013*.
17. Stone, JR; Tustison, NJ; Wassermann, EM; Polejaeva, E; Tierney, M; McCarron, RM; LoPresti, M; Carr, WS. Neuroimaging correlates of repetitive blast exposure in experienced military breachers. *National Neurotrauma Society 31st Annual meeting 2013*.
18. Lee Gabler, Robert S. Salzar, Jeff Crandall, **James Stone**, Pierre Mourad Region Specific

Revised November 2014

Viscoelastic Properties of Damaged and Healthy Adult Rat Brain under Indentation. 2013 *IRCOBI Annual Meeting*.

19. **Stone JR**, Carr WS, Young LA, Walilko T, Avants BB, Tustison N. Analysis of Diffusion Tensor Imaging (DTI) and cortical thickness maps in human military breachers using Advanced Normalization Tools (ANTS). *Advanced Technology Applications for Combat Casualty Care 2011 Annual meeting*.
20. W. Saad, C.L. Anderson, W.M. Darwish, M.G. Davies, D.L. Waldman, J.F. Angle, U.C. Turba, S.S. Sabri, **J. Stone**, T. Kitanosono, A. Park, A.H. Matsumoto. Comparison between the technical results of TIPS in liver transplant recipients and native (non-transplanted) patients. *Society of Interventional Radiology 2011 Annual Meeting*.
21. Lyman S, Turba UC, Cage D, Sildiroglu O, Sabri SS, **Stone JR**, Park AW, Saad WE, Angle JF, Matsumoto AH. Dedicated Inferior Vena Cava Filter Clinic: Evolving Clinical Practice Since 2002. *Society of Interventional Radiology 2012 Annual Meeting*.
22. Anderson C, Saad WE, Sabri SS, **Stone JR**, Matsumoto AH, Angle JF. Survey of DIRECT pathway and VIR clinical pathway graduates. *Society of Interventional Radiology 2012 Annual Meeting*.
23. **Stone JR** and Tustison NJ. Understanding the Inside of the Black Box: Optimizing Approaches for the Analysis of Diffusion Tensor Imaging and Cortical Maps in TBI. *Keystone Conference: Clinical and Molecular Biology of Acute and Chronic Traumatic Encephalopathies*. 2012.
24. G.R. Rueb, W.J. Brady, C.A. Gilliland, J.T. Patrie, W. Saad, U.C. Turba, S.S. Sabri, A. Park, **J. Stone**, J.F. Angle. Characterizing cardiopulmonary arrest during interventional radiology procedures. *Society of Interventional Radiology 2012 Annual Meeting*.
25. P.O. Simon, W.E. Saad, D. Nicholson, M.R. Bernhard, U.C. Turba, M.G. Davies, S.S. Sabri, **J. Stone**, A. Park, J.F. Angle, A.H. Matsumoto. Balloon-expandable stent-grafts for instant restenosis in atherosclerotic renal artery stenosis with prior clinical response. *Society of Interventional Radiology 2012 Annual Meeting*.
26. Holstege CP, Carr WS, Young LA, Walilko T, **Stone JR**. Low level lead exposure in breacher soldiers. *Published Abstracts, National American Congress of Clinical Toxicology Annual meeting 2011*.
27. Dave JR, Changping Y, Ahlers ST, **Stone JR**, Shaughness M, Hall A, McCarron RM, Schmid K, Tortella FC. Serum GFAP: A potential biomarker of mild traumatic brain injury produced by repeated exposure to low level blast overpressure. *National Neurotrauma Society 29th Annual meeting 2011*.
28. Tustison N, Avants B, Cook P, Kim J, Whyte J, Gee J, Ahlers ST, **Stone JR**. Multivariate analysis of diffusion tensor imaging and cortical thickness maps in a traumatic brain injury (TBI) cohort using advanced normalization tools (ANTS). *National Neurotrauma Society 29th Annual meeting 2011*.
29. Breacher Injury Consortium. New Innovations in Instrumentation to Quantify Explosive Exposure. *Advanced Technology Applications for Combat Casualty Care 2011 Annual meeting*.
30. Breacher Injury Consortium. Investigating Effects of Repeated Low-Level Blasts in a Volunteer Population. *Advanced Technology Applications for Combat Casualty Care 2011 Annual meeting*.
31. **Stone JR**, Carr WS, Young LA, Walilko T, Aiken A, Gean AD, Helm GA, and the Breacher Injury Consortium. Breacher Injury Study: Neuroimaging Results. *Published Abstracts, National Neurotrauma Society 28th Annual meeting 2010*.
32. Carr WS, **Stone JR**, Young LA, Walilko T, Parish R, Eonta SE, Jankosky C, Tsao J, and the Breacher Injury Consortium. Breacher Injury Study: Neurocognitive testing results. *Published Abstracts, National Neurotrauma Society 28th Annual meeting 2010*.

Revised November 2014

33. **Stone JR**, McMillian CR, Ahlers ST. Immunohistochemical evidence of traumatic axonal injury and blood brain barrier disruption in a rodent shock tube model. *Published Abstracts, National Neurotrauma Society 28th Annual meeting 2010.*
34. **Stone JR**, Angle JF, Schenkman NS, Turba UC, Arslan B, Swee W, Costabile RA, and Jenkins AD. Evaluation of Dyna-CT as an imaging adjunct to routine percutaneous nephrolithotripsy. *Published abstracts. Society of Interventional Radiology, 33rd Annual Scientific Meeting, 2008.*
35. **Stone JR**, Evans AJ, Angle JF, Arslan B, Turba UC, and Matsumoto AH. Assessment of aortic stent graft integrity following exposure to Onyx liquid embolic agent. *Published abstracts, Society of Interventional Radiology, 32nd Annual Scientific Meeting, 2007.*
36. **Stone JR**, Helm GA, Bass CR, Woods WA, Salzar RS, Rafaels K. Characterization of Diffuse Axonal and Neuronal Injury following Conventional and Blast-induced Traumatic Brain Injury. *Published abstracts, DARPA PREVENT blast injury teaming conference 2006.*
37. **Stone JR**, Jensen ME, Evans AJ, Zavoian S, Hagspiel KD. Hagspiel. Quantification of Embolic Debris in Distal Protection Devices: Native vs. Post-surgical Stenosis. *Published abstracts, Society of Interventional Radiology, 31st Annual Scientific Meeting, 2006.*
38. Helm GA, Mills JD, Sandahl MA, Periasamy A, Okonkwo DO, **Stone JR**. Relationship of BAD/Bcl-xL heterodimerization to Impaired Axonal Transport and Overt Axolemmal Disruption in Traumatic Axonal Injury. *Published abstracts, National Neurotrauma Society 22nd Annual meeting 2004*
39. Hawkins AS, **Stone JR**, Mills JD, Okonkwo DO, Periasamy A, Helm GA. Illuminating Protein Interactions in Tissue using Multiphoton Lifetime Fluorescent Resonance Energy Transfer (FLIM-FRET) Microscopy. *Published abstracts, National Neurotrauma Society 22nd Annual meeting 2004.*
40. **Stone JR**, Mills JD, Hawkins AS, Sandahl MA, Periasamy A, Okonkwo DO, and Helm GA. Bax/VDAC Binding Occurs in Relation to Mitochondrial Cytochrome-C Release and Caspase-3 Activation in Traumatic Axonal Injury. *Published abstracts, National Neurotrauma Society 22nd Annual meeting 2004.*
41. Okonkwo D.O., Mills J.D., Wagner J., Webb K.M., Laurent J.J., **Stone J.R.**, Helm G.A., Jane J.A. Correction of Post-Traumatic Hypoxia with Trans Sodium Crocetinate vs. Hyperoxic Therapy in Experimental Traumatic Brain Injury in Rat. *Published abstracts AANS Annual Meeting. 2003*
42. Mills J.D., **Stone J.R.**, Periasamy A., Rubin D.G., Melon D.E., Helm, G.A., Okonkwo D.O. Fluorescence Resonance Energy Transfer Demonstrates Formation of BAD/Bcl-xL Complexes in Injured Axons Following Traumatic Brain Injury in Rats. *Published abstracts AANS Annual Meeting. 2003*
43. Darvish KK, Okonkwo DO, Crandall J, and **Stone J** Head Injury in Impact Acceleration Tests on Rodents. *Published abstracts American Society of Mechanical Engineers Meeting. 2003*
44. Sandahl MA, Okonkwo DO, Boatwright EJ, Helm GA, **Stone JR**. Relationship of caspase-3 activation to axolemmal disruption and impaired axoplasmic transport in traumatic axonal injury (TAI) *Published abstracts, National Neurotrauma Society 21st Annual meeting 2003*
45. Helm GA, Rubin DG, Sandahl MA, Melon DE, **Stone JR**, and Okonkwo DO. Effect of FK506 on caspase-3 activation and two distinct populations of injured axons in traumatic brain injury. *Published abstracts, National Neurotrauma Society 21st Annual meeting 2003*
46. **Stone JR**, Mills JD, Periasamy A, Sandahl MA, Boatwright EJ, Okonkwo DO, Helm GA. Use of fluorescent resonance energy transfer (FRET) microscopy to explore relationship of BAD/Bcl-xL interaction to cytochrome-c release and caspase-3 activation in traumatic axonal injury (TAI). *Published abstracts, National Neurotrauma Society 21st Annual meeting 2003*

Revised November 2014

47. Okonkwo DO, Melon DE, Manabe H, Drummond J, **Stone JR**, Katz A, Lee KS Human adipo-derived stem cell therapy for traumatic brain injury. *Published abstracts, National Neurotrauma Society 21st Annual meeting 2003*
48. Mills JD, Okonkwo DO, Periasamy A, Sandahl MA, Helm GA, **Stone JR**. Novel application of fluorescent resonance energy transfer (FRET) microscopy in tissue to investigate BAD and Bcl-xL interactions in traumatic axonal injury (TAI). *Published abstracts, National Neurotrauma Society 21st Annual meeting 2003*
49. Darvish, K.K., **Stone, J.R.**, and Crandall, J.R. The Effect of Axonal Injury on the Material Properties of Brain Tissue. *Published Abstracts, Southern Consortium on Injury Prevention*. 2002
50. Jane J.A., Gainer J.L., Wagner J., **Stone J.R.**, and Okonkwo D.O. Correction of posttraumatic hypoxia with trans sodium crocetinate following experimental traumatic brain injury. *Published Abstracts Annual Meeting of the American Academy of Neurological Surgery*. 2002
51. **Stone, J.R.**, Okonkwo, D.O., Rubin, D.G., Diallo, A.O., Helm, G.A. Relationship of Impaired Axoplasmic Transport and Markers Targeting Multiple Levels of Axolemmal Disruption in Traumatic Axonal Injury. *Published Abstracts, 1st Joint Symposium of the National and International Neurotrauma Societies*. 2002
52. Okonkwo, D.O., Wagner, J., Melon, D.E., Jane, Sr., J.A., Gainer, J.L., **Stone, J.R.**, Helm, G.A., Trans Sodium Crocetinate Increases Oxygen Extraction to Brain Parenchyma in Rats on O₂ Supplementation. *Published Abstracts, 1st Joint Symposium of the National and International Neurotrauma Societies*. 2002
53. Singleton, R.H., Zhu, J.P., **Stone, J.R.**, and Povlishock, J.T. The Neuronal Somatic Response to Traumatic Axonal Injury. *Published Abstracts, National Neurotrauma Society 20th Annual meeting 2001*
54. **Stone, J.R.**, Okonkwo, D.O., Diallo, A.O., Mutlu, L.K., Helm, G.A. Impaired axoplasmic transport and overt axolemmal disruption can occur within distinct classes of traumatic axonal injury. *Published Abstracts, National Neurotrauma Society 20th Annual meeting 2001*
55. Okonkwo, D.O., **Stone, J.R.**, Pellicane, A.J., Rubin, D., Mellon, D.E., Mutlu, L.K., Helm, G.A. Intravenous vs. intrathecal cyclosporin A in the attenuation of traumatic axonal injury. *Published Abstracts, National Neurotrauma Society 20th Annual meeting 2001*
56. Marmarou, C., Seuhiro E., Singleton, R.H., **Stone, J.R.**, and Povlishock, J.T. The Immunophilin Ligand FK506 Attenuates the Axonal Damage Associated with Rapid Rewarming Following Post-traumatic Hypothermia. *Published Abstracts, National Neurotrauma Society 20th Annual Meeting 2001*
57. **Stone, J.R.**, Singleton, R.H., Povlishock, J.T. Neurofilament Compaction and Impaired Axoplasmic Transport Can Occur Within Distinct Classes of Traumatic Axonal Injury. *Published Abstracts, 5th International Neurotrauma Symposium 2000*.
58. Povlishock, J.T., **Stone, J.R.**, Singleton, R.H., and Suehiro, E. Novel Molecular Mechanisms of Axonal Injury. *Published Abstracts, 5th International Neurotrauma Symposium 2000*.
59. Singleton, R.H., Zhu, J.P., **Stone, J.R.**, and Povlishock, J.T. Characterization of the Neuronal Somatic Response to Axotomy. *Published Abstracts, 5th International Neurotrauma Symposium 2000*.
60. Singleton, R.H., **Stone, J.R.**, Okonkwo, D.O., and Povlishock, J.T. FK506 is More Effective than Cyclosporin A in Ameliorating Traumatic Axonal Injury. *Published Abstracts, National Society for Neurosciences 30th Annual Meeting 2000*.
61. **Stone, J.R.**, Singleton, R.H., and Povlishock, J.T. Antibodies to the C-Terminus of the b-Amyloid Precursor Protein: A Site Specific Marker for the Detection of Traumatic Axonal Injury. *Published Abstracts, National Society for Neurosciences 20th Annual Meeting 2000*.

Revised November 2014

62. **Stone, J.R.**, Singleton, R.H., Nicholson, D.W., Roy, S., and Povlishock, J.T. Caspase-3 Mediated Cleavage of the Amyloid Precursor Protein (APP) Can Occur in Traumatic Axonal Injury (TAI). *Published Abstracts, National Neurotrauma Society 19th Annual Meeting* 2000.
63. Okonkwo, D.O. and **Stone, J.R.** Caspase-3 Cleavage of Amyloid Precursor Protein and Deposition of Ab Peptide in TBI: A Mechanism for Axonal Death? *Published Abstracts, German Neurological Society 18th Annual Meeting*. 2000
64. Okonkwo, D.O., Buki, A., Koizumi, H., **Stone, J.R.**, and Povlishock, J.T. Cyclosporin A Potentiates Hypothermia Neuroprotection in Traumatic Brain Injury in Rat. *Published Abstracts, National Neurotrauma Society 18th Annual Meeting* 1999.
65. **Stone, J.R.**, and Povlishock, J.T. Immunofluorescent co-localization of Amyloid Precursor Protein and RM014 within distinct classes of Traumatically Injured Axons. *Published Abstracts, National Society for Neurosciences 29th Annual Meeting* 1999.
66. **Stone, J.R.** and Povlishock J.T. The Ultrastructural Characterization of Two Distinct Classes of Traumatically Injured Axons through the use of antibodies to the Amyloid Precursor Protein (APP). *Published Abstracts, National Neurotrauma Society 17th Annual Meeting* 1998.
67. **Stone, J.R.**, Christman, C.C., Walker, S., and Povlishock, J.T. The EM Visualization of Antibodies Targeted to Amyloid Precursor Protein in Axons Undergoing Traumatically Induced Reactive Change. *Published Abstracts, National Society for Neurosciences 27th Annual Meeting* 1997.

**UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA**

IN RE: NATIONAL FOOTBALL LEAGUE
PLAYERS' CONCUSSION INJURY
LITIGATION

No. 2:12-md-02323-AB
MDL No. 2323

Kevin Turner and Shawn Wooden,
*on behalf of themselves and
others similarly situated,*

Plaintiffs,

v.

National Football League and
NFL Properties, LLC,
successor-in-interest to
NFL Properties, Inc.,

Defendants.

THIS DOCUMENT RELATES TO:
ALL ACTIONS

DECLARATION OF THOMAS WISNIEWSKI MD

Dr. Thomas Wisniewski affirms under penalty of perjury the truth of the following facts:

1. I am a Professor of Neurology, Pathology and Psychiatry at New York University School of Medicine. I am Director of the following Programs/Centers at NYU: the Center for Cognitive Neurology, the Conformational Disorders Laboratory, the Division of Cognitive Neurology in the Department of Neurology, the Neuropathology Fellowship program, and the Pearl Barlow Memory Disorders Center. I am also co-Director of the NIH funded NYU Alzheimer's Disease Center. My *curriculum vitae* is attached as Exhibit A.

2. I have been asked to submit this declaration in support of the objection to the proposed class action settlement in the above captioned case filed by the MoloLamken LLP law firm. I am not being compensated for my work in doing so.

3. Chronic traumatic encephalopathy (or CTE) is a unique neurodegenerative disease; it is not the same as ALS, Alzheimer's disease, or Parkinson's disease.

4. Repetitive brain trauma is a necessary condition for developing CTE.

5. ALS, Alzheimer's disease, and Parkinson's disease are found in the general population of individuals who have not suffered repetitive brain trauma. Suicidality does not present as a symptom of these diseases.

6. Mood and behavioral impairments such as depression, suicidality, hopelessness, impulsivity, explosiveness, rage, and aggression, although present in the general population, appear more frequently in individuals suffering from CTE than in the general population.

7. The mood and behavioral impairments associated with CTE can present prior to the onset of CTE-related dementia and can be the cause of significant disability and distress for the patient.

8. Based on my experience and knowledge of the clinical and scientific literature, I believe that a reliable, valid, and clinically accepted diagnosis of CTE, based, in part, on objective biomarkers, will likely be possible in the next decade, if not sooner, and long before the 65-year term of the proposed NFL Concussion Litigation Settlement expires.

9. I am not aware of the use of the diagnostic or classification categories of "Neurocognitive Impairment Level 1.0," "Neurocognitive Impairment Level 1.5," or "Neurocognitive Impairment Level 2.0" anywhere in the medical or scientific community.

Pursuant to 28 U.S.C. § 1746, I state under penalty of perjury that the foregoing is true and correct.

Dated: November 25th, 2014



Thomas Wisniewski MD

Exhibit A

11/26/2014

CURRICULUM VITAE
THOMAS WISNIEWSKI

Current Appointment and Address: Professor of Neurology, Pathology and Psychiatry
New York University School of Medicine
Alexandria East River Science Park, Rm 802
450 East 29th Street
New York, N.Y., 10016

Telephone Number: 212-263-7993
Fax: 212-263-7528
e-mail: thomas.wisniewski@nyumc.org
Web Site: <http://www.med.nyu.edu/biosketch/wisnit01#>
Place of birth: Gdansk, Poland

Citizenship: USA

Education:

1980 BS	University of London, King's College, London, England
1983 MBBS (MD)	King's College Medical School, London, England

Postdoctoral Training:

Internships and Residencies:	
1983-1984	Rotating internship in Medicine and Surgery at King's College and West Hill Hospitals, London, England
1984-1985	Resident in Anatomical Pathology, Downstate Medical Center, Brooklyn, New York
1985-1987	Resident of Neurology, New York University Medical Center, New York
1987-1988	Chief Resident of Neurology, New York University Medical Center, New York
1988-1989	Clinical Fellow in Neuropathology, Columbia-Presbyterian Medical Center, Columbia University, New York
1989-1990	Chief Resident of Neuropathology, Columbia-Presbyterian Medical Center, Columbia University, New York

Licensure and Certification:

1984	Certificate of Full Registration as a Medical Practitioner, England
1985	New York State License Registration
1989	American Board of Psychiatry and Neurology Certificate in Neurology
1990	American Board of Pathology Certificate in Neuropathology

Academic Appointments:

11/26/2014

Thomas Wisniewski MD

1987-1988	Assistant Clinical Instructor in Neurology, New York University
1988-1990	Clinical Fellow in Neuropathology, Columbia University, New York
1990-1992	Clinical Instructor in Neurology, New York University
1992-1998	Assistant Professor of Neurology and Pathology, New York University
1997-	Director of the Conformational Disorders Laboratory, NYU
1998-1999	Associate Professor of Neurology and Pathology, New York University
2000-	Research Scientist, NYS Institute for Basic Research in Developmental Disabilities, Department of Developmental Neurobiology
2002-	Director of the Neuropathology Core of the New York University Alzheimer's Disease Center
1999-2005	Associate Professor of Neurology, Pathology and Psychiatry (tenured), New York University
2005-	Professor of Neurology, Pathology and Psychiatry (tenured), New York University

Hospital Appointments:

1990-1993	Instructor in Neurology, Bellevue Hospital, New York
1993-1998	Assistant Attending in Neurology, Bellevue Hospital, New York
1998-present	Associate Attending in Neurology, Bellevue Hospital, New York
1990-present	Staff Neurologist Manhattan Veterans Administration Hospital, New York
2000-present	Director of the Conformational Disorders Laboratory
2002-present	Director of the Neuropathology Core of the NIH-funded NYU Alzheimer's Disease (AD) clinical center.
2006-present	Director of the Neuropathology Fellowship Program
2007-2009	Member of the NYU Faculty Council
2007-2010	Acting Director of the Pearl Barlow Center for Memory Evaluation and Treatment
2003-present	Director of the Memory and Dementia Disorders Center
2010-present	Chief of the Division of Aging and Dementia, Department of Neurology
2011-present	Associate Director of Research, Comprehensive Center on Brain Aging
2012-2015	Member of the NYU Medical Center Faculty Council
2013-2016	Member of the NYU Senate Council
2013-present	Associate Chair of Research, Department of Neurology
2014-present	Co-Director of the NYU Alzheimer's Disease Clinical Center
2014-present	Director of the NYULMC Center for Cognitive Neurology

11/26/2014

Thomas Wisniewski MD

Major Committee Assignments:

National and Regional:

1992-present	Ad Hoc Committee of Reviewers, Annals of Neurology
1992-present	Ad Hoc Committee of Reviewers, American Journal of Pathology
1995	Program Committee for the American Association of Neuropathology
1995-96	Ad Hoc Neurological Sciences-1 Study Section Committee Member, NIH
1996	Neuroscience of Aging Study Section Committee Member, NIH
1997	Ad Hoc NIH Program Project Study Section Review Committee Member
1998	NIH side-visit of Program Project, University of Southern Alabama
1998	NIH reverse side-visit of Prusiner Program Project, University of California
1998-9	NIH Cellular and Molecular Developmental Neurosciences-2 Ad Hoc Study Section Committee Member
1999-2003	NIH Brain Disorders and Clinical Neurosciences-4 (BDCN-4) Ad hoc study section member.
1999-present	Reviewer for the American Federation of Aging Research
2003	Reviewer for the Department of Defense National Prion Research Initiative
2003-2012	Ad Hoc Study Section Committee Member, National Institutes of Health, BDCN-4 (now known as Clinical Neuroimmunology and Brain Tumors; CNBT 01, SRA: Jay Joshi), meeting at least twice a year from 2003 to 2012
2005- 2009	Permanent Study Section committee member, National Institutes of Health, NIA-N (Neuroscience of Aging) Study Section, term of committee membership: July 1, 2005 to June 30, 2009
2007-2008	Member of the Scientific Program Committee of the 11th International Conference on Alzheimer's Disease and Related Disorders
2010	Member of the NIH Brain Disorders and Clinical Neurosciences (BDCN)-Y(04) study section
2010	Member of the special emphasis panel NIH Brain Disorders and Clinical Neurosciences (BDCN)-T(02) study section
2010-2012	Council member of grant reviewers for the Creutzfeldt-Jakob Disease Foundation Inc.
2011	Member of the special emphasis panel NIH 2011/05 ZRG1 BDCN-Y (02) F meeting; Neurodegenerative Disorders (SRA: Alexander Yakovlev)
2011	Member of the NIH special emphasis panel ZRG1 BDCN-J (02)

11/26/2014

Thomas Wisniewski MD

	M, Neurodevelopment, Neurodegeneration and Stroke (SRA: Jay Joshi)
2011	Member of the NIH special emphasis panel ZRG1 BDCN-C (02) M, Neurodegeneration, Trauma, Immunology and Aging (SRA: Julius Cinque)
2011	Member of the NIH special emphasis panel ZRG1 IDM-V (02) M, Member Conflict: Topics In Microbial Pathogenesis (SRA: Gagan Pandya)
Sept 2012	Member of the NIH special emphasis panel NIH Special Emphasis Panel ZRG1 IDM-B (04), (SRA: Richard Kostriken)
Oct 2012	Member of the NIH special emphasis panel MDCN Integrated Review Group ZRG1 MDCN-F(59) R (SRA: Joanne Fujii)
Feb 2013	Member of NIH special emphasis panel 2013/05 ZRG1 IDM-S (02) M, Member Conflict: Topics in Infectious Diseases and Microbiology (SRA: Liangbiao Zheng)
Feb 2013	Member of NIH 2013/05 CNN Clinical Neuroscience and Neurodegeneration Study Section, (SRA: Samuel Edwards)
June 2013	Member of the NIH special emphasis panel: Neurodegenerative and Neurodevelopmental Disorders Special Emphasis Panel ZRG1 BDCN-Y (02) (SRA: Alexander Yakovlev)
May 2013	Member of the NIH study section: 2013/10 BNVT Bioengineering of Neuroscience, Vision and Low Vision Technologies Study Section (SRA: Robert Elliot)
June 2013	Member of the special NIH/NIA special emphasis panel to review R01 applications in response to RFA AG13-013 (SRA: Alexander Parsadanian)
June 2013	Member of the 2013/10 ZAG1 ZIJ-7 (01) Degenerative and Dementing Diseases study section (SRA: Ramesh Vemuri)
June 2013	Member of the 2013/10 ZRG1 BDCN-Y (02) Neurodegenerative and Neurodevelopmental Disorders Study Section (SRA: Alexander Yakovlev)
Sept 2013	Member of the BDCN Integrated Review Group (BDCN IRG) Grant overview study section (SRA: Joy Joshi)
Sept 2013	Member of the Chronic Dysfunction and Integrative Neurodegeneration (CDIN) Study Section (SRA: Wei-Qin Zhao)
Feb 2014	Member of the Special Emphasis Panel/Scientific Review Group Biobehavioral Regulation, Learning and Ethology (BRLE), 2014/05 ZRG1 BBBP-V (55) R (SRA: Mark Lindner)
March 2014	Chairman and member of the Clinical Neuroimmunology and Brain Tumors Study Section [CNBT] Special Emphasis Panel (BDCN-J (02) M) (SRA: Jay Joshi)
March 2014	Member of the Special Emphasis Panel/Scientific Review Group

11/26/2014

Thomas Wisniewski MD

2014/05 ZAG1 ZIJ-6 (M1) Drug Development for Alzheimer's Disease (SRA: Alexander Parsadanian)
 June 2014 Member of the 2014/10 NSD-C Neurological Sciences and Disorders C Study section. (SRA: William Benzing)
 Sept 2014 Member of the U01 AD Drug Development Review Panel ZAG1 ZIJ-6(J4). (SRA: Alexander Parsadanian)

NIH Alzheimer's Disease Research Center and Program Project Site-Visit Committee Member :

Nov., 1993 NIH reviewer of Massachusetts Alzheimer's Disease Research Center
 Feb., 1994 NIH reviewer of the University of Southern California Alzheimer's Research Center
 Sept., 1994 NIH reviewer of the University of Washington, St. Louis Alzheimer's Disease Research Center
 Jan., 1996 NIH reverse site-visit of Alzheimer's Disease Research Centers
 March, 1999 NIH site-visit reviewer of Alzheimer's Program Project at USC
 Feb, 2000 NIH site-visit reviewer of Program Project at the Univ. of S. Alabama
 March, 2000 NIH site-visit reviewer of Program Project at Univ. Cal, Irvine
 Oct. 2000 NIH site visit reviewer of Program Project at Univ. Cal, Irvine
 Jan, 2001 Member of NIA ADCC grant applications (ZAG1 PCR-5) study section
 April 2003 Member of the NIH Review Committee for the Mt. Sinai Medical Center Alzheimer's Disease Research Center
 March, 2004 Member of the NIH Review Committee for the Mt. Sinai Medical Center Alzheimer's Disease Program Project
 March, 2004 Member of the NIH Review Committee for the John Hopkins University Alzheimer's Disease Program Project
 June, 2004 Member of the NIH Review Committee for the University of Philadelphia Program Project (PI Virginia Lee, P01 AG017586-06, Fronotemporal Dementias: Genotypes and Phenotypes).
 Jan 2008 Member of the NIH Review Committee for the University of California, San Francisco Program Project (PI Lennart Mucke P01 AG022074-06, Proteinopathies of the Aging Central Nervous System).
 Dec 2008 Member of the NIH Review Committee for the University of California, San Francisco Program Project (PI Stanley Prusiner, P01 AG021601-06, Novel Therapeutics for Prion Disease).
 2004-present Member of External Advisor Panel for the Mt. Sinai Alzheimer's Disease Research Center, meeting once a year
 2005-present Member of the External Advisor Panel for the University of South

11/26/2014

Thomas Wisniewski MD

Oct 2009	Florida Alzheimer's Disease Research Center, meeting once a year Member of the NIH Review Committee for the University of California, San Francisco Program Project (PI Stanley Prusiner, P01 AG010770, Pathogenesis of Age-Dependent CNS Degeneration).
Nov 2009	Member of the NIH Review Committee for the University of Pittsburgh School of Medicine Program Project (PI William Klunk, P01 AG025204-06, Neuroimaging and Aging).
June 2010	Member of the NIH Review Committee for the University of California, San Francisco Program Project (PI Stanley Prusiner, P01 AG010770-18, Pathogenesis of Age-Dependent CNS Degeneration).
July 2010	Member of the NIH Review Committee of the University of Philadelphia University Program Project (PI Virginia Lee, P01 AG017586-11, Frontotemporal Dementias, Genotypes and Phenotypes).
October 2010	Member of the NIH Review Committee of the Mount Sinai School of Medicine Program Project (PI Samuel Gandy, P01 AG010491, Interdisciplinary Approach to Alzheimer Drug Discovery).
April 2012	Member of the special emphasis panel ZNS SRB-J (1) "Udall Center Review" (SRA: Birgit Neuhuber)
Nov 2012	Chairman of the of the special emphasis panel to review the UC Irvine Program Project Grant PO1AG000538-34 (PI Carl W Cotman; Behavioral and Neural Plasticity in the Aged)
April 2013	Member of the special emphasis panel: ZNS SRB-J (1) "Udall Center Review" (SRA: Birgit Neuhuber)
Oct 2013	Member of the Alzheimer's Disease Research Center (ADRC) 2014/01 ZAG1 ZIJ-4 (J1) review committee (SRA: William Cruce)
Nov 2013	Member of the special emphasis panel: 2014/01 ZAG1 ZIJ-6 (J2) of the program project grant entitled: Therapeutics for Prion Disease (P.I.: Stanley Prusiner) (SRA: Alexander Parsadanian)
Dec 2013	Chairman of the special emphasis panel: 2014/01 ZAG1 ZIJ-6 (J1) of the program project grant entitled: Behavioral and Neural Plasticity in Aging (P.I.: Carl Cotman) (SRA: Alexander Parsadanian)
April 2014	Member of the special emphasis panel: 2014/05 ZAI1 RWM-M (M1) 1, "NIAID Investigator Initiated Program Project Applications (P01)" (SRA: Richard Morris)
June 2014	Member of the special emphasis panel: 2014/10 ZAG1 ZIJ-5 (O1) Amyloid and Vascular Pathology in AD, 2 P01 AG025204-11

11/26/2014

Thomas Wisniewski MD

June 2014	(P.I.: William E. Klunk) (SRA: Elaine Lewis) Member of the special emphasis panel: 2014/10 ZAG1 ZIJ-7 (O1) Review of program project entitled: Degenerative and Dementing Diseases, PO1AG002132-34 (P.I.: Stanley Prusiner) (SRA: Ramesh Vemuri)
June 2014	Chairman of the special emphasis panel: 2014/08 ZAI1 RWM-M (S3) 1 "NIAID Investigator Initiated Program Project Applications (P01)" for review of PO1 AI106705-01A1 entitled: Mechanisms of Transmissibility in Prion Diseases (P.I.: Witold Surewicz) (SRA: Richard Morris)
July 2014	Chairman of the special emphasis panel: 2014/08 ZAI1 RWM-M (S2) 1 "NIAID Investigator Initiated Program Project Applications (P01)" for review of PO1 AI07774-06 entitled: Pathogenesis, Transmission and Detection of Zoonotic prion diseases (P.I.: Claudio Soto) (SRA: Richard Morris)

Awards:

- | | |
|-----------|--|
| 1999 | Zenith Award from the Alzheimer's Disease Association |
| 2002 | Alzheimer Award from <i>The Journal of Alzheimer's Disease</i> (for the best publication in their Journal for the year). |
| 2009 | Prion 2009 prize at the International Prion 2009 meeting in Greece |
| 2011 | Dr. Henry & Krystyna Wisniewski Memorial Award from the Alzheimer's Disease Foundation of Staten Island |
| 2008-2014 | Listed in "Best Doctors in America" (bestdoctors.com) |
| 2014- | Elected as Distinguished Fellow of the Kosciuszko Foundation Collegium of Eminent Scientists |

Membership in Professional Societies:

- 1982- British Medical Association
1984- American Medical Association
1987- American Academy of Neurology
1989- American Association of Neuropathology
1996- Society for Neuroscience
1998- The Harvey Society
2012- Fellow of the American Neurological Association

Editorial Boards:

- 1997-2002 Editorial Board, Amyloid
1998-2001 Editorial Board, Journal of Neuropathology and Experimental Neurology
2000-2001 Editorial Board, Journal of Alzheimer's Disease
2001-2002 Senior Editor, Journal of Alzheimer's Disease
2002-2005 Editorial Board Acta Neuropathologica

11/26/2014

Thomas Wisniewski MD

2004-2006	Associate Editor Current Alzheimer Research
2008-	Editorial Board Future Neurology
2009-	Editorial Board, Alzheimer's Research and Therapy
2010-2012	Editorial Board, Translational Neuroscience
2011-2013	Editorial Board, Journal of Biological Medicine
2011-2015	Editorial Board, World Journal of Pharmacology
2011-2012	Associate Editor, Journal of Alzheimer's Disease
2011-2014	Editorial Board, PLoS ONE
2011-2015	Senior Foreign Editor, Chinese Journal of Contemporary Neurology and Neurosurgery (ISSN 1672-6731)
2013-2014	Editorial Board, Dataset Papers in Science
2013-2016	Editorial Board, Annals of Vaccines and Immunization

Major Research Interests:

1. The pathogenesis and treatment of Alzheimer's Disease.
2. Treatment approaches for prion diseases.
3. Development of novel amyloid imaging methods.
4. The biochemistry and molecular biology of other cerebral amyloidoses.
5. The neuropathology and etiology of autism and autism spectrum disorders.

Principal Clinical and Hospital Service Responsibilities:

1990-present	Attending Physician, Bellevue Hospital, New York (serve as the Neurology Attending on the general Neurology Ward 1-2 months/year)
1990-present	Attending Physician Neurology Department, Tisch Hospital (NYU Med. Cent.)
1990-present	Neurology Consult Attending Physician, Manhattan Veterans Administration Hospital, New York (serve as the Consult Neurology Attending for general Neurology on a part time basis year round and run a Dementia clinic once/week).
2005-present	Director of Memory and Dementia Disorders Center, NYU Medical Center
2005-present	Member of the Neurology Department Promotions Committee
2006-present	Neuropathology Fellowship Program Director, NYU Medical Center
2008-2010	Acting Director of the Pearl Barlow Center for Memory Evaluation and Treatment, NYUSM
2009-present	Director of the Cognitive Neurology Division of the Department of Neurology, NYUSM
2011-present	Associate Director of Research, NYU Comprehensive Center on Brain

11/26/2014

Thomas Wisniewski MD

	Aging
2013-present	Associate Chair for Research, NYU Department of Neurology
2014-present	Co-Director of the NYU NIH funded Alzheimer's Disease Clinical Core
2014-present	Director of the NYU Center for Cognitive Neurology

Teaching Experience:

1984-1985	Organized lectures in General Pathology, Downstate Medical Center, Brooklyn, New York
1987-1988	Lecture Organizer in General Neurology, New York University Medical Center
1988-1990	Course developer and lecturer in Neuropathology, Columbia-Presbyterian Medical Center, New York
1990-present	Clinical Lecturer in Neurology Course, New York University Sch. Med.
1998-present	Lecturer and Organizer of Mechanisms of Disease: The Nervous System Course, NYU Sch. Med.
1999-present	Lecturer in Molecular Signaling and Drug Development Course, NYU Sch. Med.
1999-present	Lecturer in Neurogenetics Course, NYU Sch. Med.
1999-present	Lecturer in Pathology Board Review course (Neuropathology), NYU Sch. Med.
2000-2005	Lecturer in Psychiatry Board Review course, NYU Sch. Med.
2008-present	Lecturer in the Advanced Immunology: Neuroimmunology Course, NYU Sch. Med.
2009-present	Lecturer in Neuroscience Course in Disorders, NYU Sch. Med.
2006-present	Director of Neuropathology Fellowship, NYU Sch. Med.
2012	Lecturer and Course designer of the first Interclerkship Intensive for NYULMC Class of 2014 on Cognitive Issues in the Health Care Setting: Informed Consent, Physician Impairment, Capacity, Ethics, Dementia and Delirium.

Clinical Trial Participation:

2011-2012	Investigator on protocol ELN115727, a Phase 3 Extension, Multicenter, Double-Blind, Long Term Safety and Tolerability Treatment Trial of Bapineuzumab (AAB-001, ELN115727) in Subjects with Alzheimer's Disease who Participated in Study ELN115727-301 or in Study ELN115727-302 (Protocol ELN115727-351), sponsor: Janssen Ltd.
2011-2013	Safety Monitor of Study: Family History of Alzheimer's Disease (AD), Hypometabolism and Oxidative Stress , Protocol: H# 08-857
2011-2012	Investigator on Protocol H8A-MC-LZAM, Effect of Solanezumab (LY2062430), an Anti-amyloid beta monoclonal antibody on the

11/26/2014

Thomas Wisniewski MD

	progression of Alzheimer's disease as compared to placebo; sponsor: Eli Lilly and Co.
2013-2014	Investigator on protocol BP28248, RO460522 Efficacy and Safety Study in Moderate AD; sponsor: Roche/Genentech
2013-2014	Investigator on protocol 017 P07738, A randomized, placebo controlled, parallel-group, double blind efficacy and safety trial of MK-8931 in subjects with mild to moderate Alzheimer's disease; sponsor: F.Hoffmann-La Roche Ltd
2014-2015	Investigator on protocol S12-01284, Phase II study to evaluate the impact on biomarkers of resveratrol treatment in patients with mild to moderate Alzheimer's disease; sponsor: NIH
2014-2015	Investigator on protocol S14-00053, Phase III, Randomized, Placebo-Controlled, Parallel-Group, Double-Blind Clinical Trial to Study the Efficacy and Safety of MK-8931 (SCH 900931) in Subjects with Amnestic Mild Cognitive Impairment Due to Alzheimer's Disease (Prodromal AD); sponsor: Merck Sharp & Dohme
2014-2015	Investigator on protocol S14-00148, A Phase 2, randomized, multicenter, double blind, placebo controlled, parallel group study comparing HT-0712 with placebo in subjects with age associated memory impairment (AAMI); sponsor: Dart NeuroScience

Grant Support:**Principal Investigator:**

1991-1994	PI of Alzheimer's Disease Association, Clinical Investigator Initiated Award Grant (IIRG91-102): The Lewy body Variant of Alzheimer's disease
1992-1997	PI of National Institute of Health (National Institute of Aging) Clinical Investigator Award (K08-AG00542-01): Lewy Body Disease and Gelsolin
1992-1993	PI of New York University Medical Center Alzheimer's Disease Center Pilot Study: The Source of Alzheimer's Amyloid Protein.
1995-1996	PI of New York University Medical Center Alzheimer's Disease Center Pilot Study: Alzheimer's disease and Amyloid β Fibrillogenesis.
1995-1996	PI of National Institute of Health (National Institute of Aging) Pilot Study in LEAD award. Theoretical molecular modeling of amyloid β .
1997-1998	PI of National Center for Research Resources, National Institute of Health. Shared Instrumentation Grant. FTS-6000 Spectrometer Mainframe
1997-1998	PI of National Institute of Health (National Institute of Aging) Pilot Study in LEAD award (AG10953) The Biochemistry of Human Prion Strains.
1998-2001	PI of Alzheimer's Disease Association, Investigator Initiated Award:

11/26/2014

Thomas Wisniewski MD

1999-2001	Imaging of Alzheimer's disease lesions <i>in vivo</i> (IIRG-98-017) PI of Alzheimer's Disease Association, Zenith Award: Amyloid β and Apolipoprotein E Interactions in Vivo and <i>in Vitro</i> (Zenith-99-1791).
2000-2005	PI of the Neuropathology Core on NIH Program Project (PO1AG17617): In Vivo Models of Neuronal and Vascular Pathobiology in AD (PI of Program Project is Dr. Ralph Nixon)
2000-2004	PI of Project 3 (The role of ischemia and vascular pathology in Alzheimer's disease) on NIH Program Project (PO1AG17617): In Vivo Models of Neuronal and Vascular Pathobiology in AD
2000-2002	PI of American Parkinson Disease Association Investigator Grant: Biochemistry and Immunohistochemistry of Lewy Bodies.
2002-2005	PI of Alzheimer's Disease Association, Investigator Initiated Research Award: Vaccine Therapy for the Prevention and Treatment of Prion Disease (IIRG-02-3702), Annual Direct: \$72,727
2006-2009	PI of Alzheimer's Disease Association, Investigator Initiated Research Award: Mucosal Immunization Therapy in Alzheimer's Disease Mice (IIRG-06-26434), Annual Direct: \$72,727
2005-2008	PI of NIH Fogarty International Research Collaborative Award, (R03 TW006848): Therapy for Alzheimer and Prion diseases. Annual Direct: \$30,342
2007-2009	PI of NIH/NIA/Fogarty International Center R21 grant (R21 AG028187) Immunization Approaches for Alzheimer's Disease. Annual Direct: \$86,700
2000-2015	Director of the Neuropathology Core of the NYU Alzheimer's Disease Clinical Center (NIH NIA AG08051), Annual Direct: \$100,000
2008-2014	PI of Neuropathology Core of PPG "Characterization of the Pathological and Biochemical Markers that Correlate to the Clinical Features of Autism", AS073234; US Army Medical Research Acquisition Act (W81XWH-08-1-0741), Annual Direct of Core: \$123,404; total project \$1,900,000
1999-2011	PI of National Institute of Health (NIA) R01 Amyloid β peptide and apolipoprotein E AG15408, Annual Direct: \$ 173,939
2002-2012	PI of NIA/NIH R01 grant: Detection and Clearance of AD Amyloid Lesions. AG20245, Annual Direct: \$184,500
2004-2014	PI of NINDS/NIH R01 grant: Therapeutic Approaches for Prion Disease, NS047433; Annual Direct: \$250,000
2009-2013	PI of Challenge Grant 3R01NS047433-06S1 NIH/NINDS; Therapeutic Approaches for Prion diseases. Total Direct Costs for Grant: 1,242,287.00
2010-2013	PI of Alzheimer's Association Investigator Initiated Research Grant: Immunotherapy for amyloid plaques, CAA and NFT pathology. Total Direct Costs for the Grant: \$200,000
2010-2015	PI of NINDS/NIH R01 grant: 1R01NS073502: Therapeutic Targeting of

11/26/2014

Thomas Wisniewski MD

	Abnormal Conformation in Neurodegenerative Disease. Annual Direct: \$218,750
2011-2012	NYU Langone Multiple R01 Research Incentive Grant, Annual Direct: \$20,000.
2013-2015	PI of Seix Dow Foundation Grant, Annual Direct: \$1,000,000
2012-2013	PI of an Alzheimer's Drug Discovery Foundation grant: Development of peptidomimetic ApoE/A β Binding Inhibitors as an Effective and Non-toxic Therapeutic Approach for AD, Annual Direct: \$100,000
2012-2013	NYU Langone Multiple R01 Research Incentive Grant, Annual Direct: \$24,425.
2012-2017	PI of NIA/NIH R01 grant: Detection and Clearance of AD Lesions. AG20245, Annual Direct: \$200,000.
2014-2019	PI of NIAID/NIH R01 grant: Vaccination for Chronic Wasting Disease. AI108213-01A1, Annual Direct: \$759,860. Under review

Co-Investigator/Co-PI:

1995-1999	Co-Investigator of National Institute of Health (National Institute of Aging) (R01 AG08721-04, PI: Frangione, B): Amyloid Angiopathy, Early Plaque and Aging
1999-2004	Co-Investigator of National Institute of Health (R01 AR02594, PI: Frangione B): Conformational Disorders: Amyloid and Prion Proteins. Annual Direct: \$250,000
2009-2011	Co-Investigator National Institute of Health (1RC2AG036501-0110, PI: de Leon M): Imaging Neuroinflammation in Alzheimer's Disease with [11C]Arachidonic Acid.
2011-2012	Co-PI of NYU Applied Research Support Grant (Co-PI: Goni F) Monoclonal Antibody Development Targeting Pathological Oligomers as a Treatment for Alzheimer's Disease. Annual Direct: \$50,000
2012-2014	Co-PI of NIH 1R21NS079676-01 (PI: Henrieta Scholtzova): Testing of Innate Immunity Stimulation via TLR9 on CAA using Non-human Primates. Annual Direct: \$150,000
2014-2016	Co-PI of SBIR NIH grant 1R43AG044248-01 (PI: Andrew Wang): Detection of Vascular and Plaque Alzheimer's Amyloid Deposits by microMRI using Iron Oxide Nanoparticles, under review. Company partner: Ocean NanoTech, LLC. Annual Direct: \$150,000, under review
2012-2016	Co-PI of a Research Training Grant from the Saudi Arabia Cultural Mission to Train Saudi Physicians in Neuroscience Research (PI: Allal Boutajangout/Wisniewski). Annual Direct: \$320,000
2012-2015	Co-PI of Alzheimer's Disease Association Investigator Initiated Grant

11/26/2014

Thomas Wisniewski MD

- IIRG-12-239474 (PI: Henrieta Scholtzova): Innate immunity stimulation as a novel therapeutic approach in AD. Annual Direct: \$80,000
- 2013-2016 Co-PI of Alzheimer's Disease Association Investigator Initiated Grant IIRG-13-283707 (PI: Fernando Goni): Conformational Directed Immunotherapy Targeting both Tau and A β Pathology. Annual Direct: \$80,000, Annual Direct: \$80,000
- 2014-2016 Investigator on NIH grant: Restoring Animal Research Resources Lost Due to Super Storm Sandy. 1R24OD018339-01 (PI: David Levy) Direct Costs: \$3,971,911. Budget to Wisniewski Lab: \$59,211/yr
- 2014-2019 Mentor on NIH Grant (K23 AG048622-01): New Region-Specific Targeted MRI to Characterize Alzheimer's Disease Pathology (PI: T. Shepherd). Direct Costs: \$178,630/yr.

Patents:

11/26/2014

Thomas Wisniewski MD

- 1) Synthetic Immunogenic but Non-Amyloidogenic Peptides Homologous to Amyloid β for Induction of an Immune Response to Amyloid β and Amyloid Deposits; **Wisniewski T**, Frangione B, Sigurdsson E. Filed 5/22/2001, **Granted: 3/30/2004**, **Patent Number: 6,713,450**
- 2) Detection of Alzheimer's Amyloid by Magnetic Resonance Imaging; **Wisniewski T**, Sigurdsson, E, Zaim Y, Turnbull D. Filed 5/23/2001, **Granted: 11/23/2004**, **Patent Number: 6,821,504**
- 3) Synthetic ImmunoGenic but Non-Deposit-Forming Polypeptides and Peptides Homologous to Amyloid β , Prion Protein, Amylin, α -Synuclein or Polyglutamine Repeats for Induction of an Immune Response Thereto. Frangione B, Sigurdsson E, **Wisniewski T**. Filed 11/21/02, **Granted: 01/20/09**, **Patent Number: 7,479,482**
- 4) Synthetic immunogenic but non amyloidogenic peptides homologous to amyloid beta for induction of an immune response to amyloid beta and amyloid deposits. **Wisniewski T**., Sigurdsson E, Frangione B. Filed 09/19/03, **Granted 09/23/2008**, **Patent Number: 7,427,655**
- 5) Prevention and Treatment of Alzheimer Amyloid Deposition. **Wisniewski T**, Sadowski M, Sigurdsson E, Frangione B . Filed 3/26/04, **Granted: 12/15/09**, **Patent Number: 7,632,816**
- 6) Mucosal Immunization to prevent prion infection. **Wisniewski T**, Sigurdsson E, Chabalgoity JA, Goni F. Filed 11/18/05, Application Number: 20070059807 (NYU: 10/558,276), **Granted by patent office 11/7/13; Issued 04/01/14**, **Patent Number: 8,685,718**
- 7) Imaging Agents for Protein Misfolding. **Wisniewski T**, Min J, Li Q, Chang YT. Filed 2/11/08, Application Number: 20100279340 (NYU: 12/029,271), **Issued 4/17/12**: **Patent Number: 8,158,380**.
- 8) Synthetic immunogenic but non-amyloidogenic peptides homologous to amyloid beta. for induction of an immune response to amyloid beta and amyloid deposits. Frangione B, **Wisniewski T**, Sigurdsson EM, **Issued 4/20/10: Patent Number: 7,700,107**
- 9) Method for treating amyloid disease. Frangione B, Sigurdsson EM, **Wisniewski T**, Ghiso J. Filed 02/05/09. **Patent Issued: 11/27/12; Patent Number: 8,318,175**
- 10) Immunotherapy targeting the shared abnormal conformational state of amyloidogenic peptides/proteins. **Wisniewski T**, Goni F. Filed 05/05/10; Application No.: 20100284909 (12/774,293), **Issued: 4/2/13; Patent Number: 8,409,584**

11/26/2014

Thomas Wisniewski MD

- 11) Method for treating amyloid disease. Wisniewski T, Goni F. Filed 7/19/12. **Patent Issued: 1/24/13; Patent Number: WO 2013/013056 A1**
US patent (13/553,566) allowed 8/8/14, issue of patent pending payment of issue fee
- 12) Preventing and treating amyloid- β deposition by stimulation of innate immunity.
Wisniewski T, Scholtzova H, Kascak RJ, Spinner DS. Filed 08/20/2008,
Application Number: 12/918,739, pending
- 13) Immunotherapeutic modulation of amyloidogenic disease using non-fibrillogenic, non-amyloidogenic polymerized proteins and peptides. **Wisniewski T**, Goni F. Filed 07/19/11; Application No.: 61509320, pending
- 14) A humanized single-chain antibody against beta 3 integrin inhibits pulmonary metastasis by preferentially fragmenting activated platelets in the tumor microenvironment. **Wisniewski T**, Zhang W, Dang S. Filed 8/2/12; **Patent Issued: 02/06/14; Patent Number: 20140037629**

Listing (Partial) of Past and Present Students, Trainees and Faculty Members of Conformational Disorders Laboratory (P.I. Thomas Wisniewski):

11/26/2014

Thomas Wisniewski MD

Past / Current Trainee	Trainee Name	Pre or Post Graduate	Post Doc Research Training Period	Prior Academic Degree			Title of Research Project	Present Position (past trainees) Source of Support (Present trainees)
				Degree(s)	Year(s)	Institutions(s)		
Past	Sigurdsson, Einar	Post	1999-2001	Ph.D.	1997	Pharmacology; Loyola University	Multiple projects: Vaccination for conformational disorders	Associate Professor of Physiology and Neuroscience, and Psychiatry, NYUSM
Past	Golabek, Adam	Post	1996-2002	Ph.D.	1996	Polish Academy of Science	Pathological Chaperones and AD	Research Scientist, Grade V, NYU Institute for Basic Research in Developmental Disabilities
Past	Dowjat, Karol	Post	1996-2003	Ph.D.	1992	Polish Academy of Science	The role of presenilin in the pathogenesis of familial AD	Research Scientist, Grade VI, NYU Institute for Basic Research in Developmental Disabilities
Past	Aucouturier, Pierre	Post	1999-2002	Ph.D.	1993	University of Paris, France	Role of Dendritic cells in the infectivity of Prions	Senior Lecturer at Université Pierre et Marie Curie, Paris, France.
Past	Permann e, Bruno	Post	1999-2002	Ph.D.	1998	University of Paris, France	The role of apoE in Abeta fibrillogenesis	Research Scientist, Merck-Serono, Geneva, Switzerland
Past	James Ripellino	Post	2003-2004	PhD	1990	Boston University	Amyloid beta measurement in biological fluids	Left academics
Past	Tezapsidis, Nikolas	Post	2000-2001	PhD	1991	The University of Sussex, UK	The role of presenilin in Alzheimer's disease	Assistant Professor, Columbia University

11/26/2014

Thomas Wisniewski MD

Past	Wu, Hope	Post	2003-2004	MD PhD	1982 1992	Shanghai Medical University University of Minnesota	Novel Imaging agents for amyloid lesions	Attending Pathologist, NY Eye and Ear Infirmary
Past	Shao, Charles	Post	2000-2002	MD PhD	1983 1990	Beijing Second Medical College, China Emory University	The role of apoE isotypes in AD	Assistant Professor of Pathology, SUNY Downstate Medical Center
Past	Sadowski , Martin	Post	2002-2009	MD PhD	1995 1996	Medical University of Gdansk, Gdansk, Poland	The role of apolipoprotein E in Alzheimer's disease	Associate Professor of Neurology, NYUMC
Past	Fowkes, Mary	Post	2003-2005	MD	1999	University of Maryland	Neuropathology Fellow	Assistant Professor of Pathology, Mt. Sinai School of Medicine
Past	Boutajangout, Allal	Post	2005-2008	PhD	2005	Free University of Brussels, Belgium	A β Immunomodulation for AD	Res. Assistant Professor, NYUSM;
Present	Li, Yong-sheng	Post	2001-present	MD	1995	Shanghai Medical University	Developing Imaging Agents for AD	NYU Research Scientist, NYUSM NIH AG20245
Present	Scholtzova, Henrieta	Post	2001-present	MD PhD	1999 2010	P.J. Safarik University, Kosice, Slovakia NYU	Innate immunity for AD therapy Immunotherapy for Neurodegenerative disorders	Assistant Professor of Neurology, NYULSM; NIH NS047433 and AG 20245
Present	Prelli, Frances	Post	2003-present	BS	1960	NYU	Models of Prion infection	Associate Scientist, NYUSM; NIH NS047433 Alzheimer's disease Association
Past	Ji, Yong	Post	1998-2002 2008-2010	MD	1995	Shanghai Medical University	In vivo imaging of amyloid lesions	Chairman of Neurology, Tianjin Central Hospital, China

11/26/2014

Thomas Wisniewski MD

Past	Pankiewicz, Joanna	Post	2004-2010	MD PhD	1994 2001	Collegium Medicum Jagiellonian Univ. Cracow, Poland	Therapeutic antibodies for prion disease	Research Assistant Professor of Neurology; NYUMC
Present	Goni, Fernando	Post	2003-Present	PhD	1983	University of Buenos Aires	Vaccination for prion disease	Associate Scientist, NYUSM; NIH NS47433 and AG028187
Present	Sun, Yanjie	Post	2007-Present	MS	1997	China Medical University	Transgenic models of neurodegeneration	Research Scientist, NYUSM, NIH AG 15408
Past	Lilla Hatos-Agyi	Post	2010-11	MD	2008	Medical University of Innsbruck	Vaccination studies on Tg mice	Transplant Coordinator
Past	Yang, Jing	Pre	2006-2011	PhD student	2011	Graduated NYU PhD Sackler program Jan. 2011	μ MRI Detection of amyloid deposits and therapeutic approaches for their clearance by inhibition of apoE/A β interactions in AD	Medical Student
Past	Guibhot, Jeanne	Pre	2011	BS PhD Student		2010 Rennes 1 University France	Behavioral Studies in AD model mice	Completing PhD
Past	Shannon Chiu	Post	2011	BA MD student	2008 2014	Williams College NYU School Medicine	μ MRI studies in Tg mice	Neurology Resident Mayo Clinic
Past	Luis Bragarolas	Post	2011	BS PhD student	2011	University of Barcelona	Conformational studies of amyloid proteins	Research Scientist University of Barcelona
Past	Erika Chung	Pre	2006-2011	PhD	2011	NYU PhD Sackler program,	Novel therapeutic approaches for	Laboratory Manager Biotechnology Start up Company

11/26/2014

Thomas Wisniewski MD

						graduated 09/2011	prion diseases	
Past	Sara Ghobraiel	Pre	201- 2012	MD	2012	School of Medicine's Honors Program	Detection and Clearance of AD Lesions	Internal Medicine Resident
Past	Sarah Lund	Pre	2012	BS	2012	Summer Undergraduate Research Program in Graduate Biomedical Sciences	Detection and Clearance of AD Lesions	PhD student, Oxford University
Past	Chan Tian	Post	2012	MD PhD	2002 2007	Peking University	Therapeutic Approaches for Prion Diseases	Professor, Peking University
Past	Clare Cunliffe	Post	2005- 2008	MD	2000	University of London	Neuropatholog y Fellow	Pathology Faculty University of Edinburgh
Current	Shan Liu	Post	2011-	PhD	2006	Fudan University	Detection and Clearance of AD Lesions	NIH, AG20245
Past	Kia Newman	Post	2009- 2011	MD	2004	University of Miami	Neuropatholog y Fellow	Medical Examiner OCME NYC
Past	Kant Matsuda	Post	2010- 2012	MD	2005	University of Tokyo	Neuropatholog y Fellow	Assistant Professor of Pathology, University of Manitoba
Past	Valentino Wong	Pre	2011-	BA	2010	Dartmouth College	Therapeutic Targeting of Abnormal Conformation in Neurodegener ative Disease	Medical Student
Past	Ariel Breitbart	Pre	2012- 2013	BS	2010	NYU	Detection and Clearance of AD Lesions	Medical Student
Past	Daniel Peyser	Post	2012- 2013	BS	2011	NYU	Therapeutic Approaches for Prion Diseases	Medical Student
Current	Krystal	Post	2012-	BS	2011	Augusta State	Therapeutic	NIH, NS47433

11/26/2014

Thomas Wisniewski MD

	Herline					University	Approaches for Prion Diseases	
Past	Eileen Do	Post	2012-2013	BS	2011	NYU	Detection and Clearance of AD Lesions	Medical Student
Past	Shannon Monaghan	Post	2012-2013	BS	2008	University of North Texas	Therapeutic Targeting of Abnormal Conformation in Neurodegenerative Disease	Medical Student
Current	Arline Faustin	Post	2011-2015	MD	2006	SUNY Downstate Medical Center	NYU Alzheimer's Disease Clinical Center	NIH, NIA AG08051
Past	Faris Yaghmour	Post	2012-2014	MBBS	2008	Umm Al Qura University	Neuroscience Training Fellowship	Clinical Instructor Umm Al Qura University
Past	Ahmed Noorsaeed	Post	2013-2014	MBBS	2009	King Bin Abdul-Aziz for Health Sciences	Neuroscience Training Fellowship	Pathology Resident Mt. Sinai School of Medicine
Past	Peter Chianchiano	Pre	2012-2014	BS	2011	NYU	Detection and Clearance of AD Lesions	PhD Student University of Connecticut
Current	Lisa Sprinzen	Pre	2012-2014	BS	2012	NYU	Induction of TLR9 Signaling to Reduce Alzheimer's Pathology in Squirrel Monkeys	NIH, NS073502
Past	Shannon Chiu	Post	2013-14	BS, MD student	2011	Williams College, NYU School Medicine	Innate Immunity Stimulation for AD Treatment	Neurology Resident Mayo Clinic
Past	Madeline Velez	Post	2014	BS, MD student	2008 2014	NYU School Medicine	Identification of novel imaging agents for tau and oligomers	Surgery Resident NYU

11/26/2014

Thomas Wisniewski MD

Current	Mitchell Marta Ariza	Pre	2014- 2015	BSc	2011	Pontificia Universidad Javeriana	Therapeutic Approaches for Prion Diseases/Seix Dow Found.	NIH, NS47433 Seix Dow Foundation
Current	Helen Lyo	Pre	2013- 2014	BA	2015	NYU College of Arts and Sciences	Approaches to stimulate innate immunity in AD	NIH, NS73502 Seix Dow Foundation
Current	Timothy Shepard	Post	2014- 2019	MD	2009	NYU School Medicine	New Region- Specific Targeted MRI to Characterize Alzheimer's Disease Pathology	Assistant Professor of Neurology, NYULMC NIH, K23 AG048622-01
Current	Franck Maurinot	Pre	2014	BA	2013	University of Paris 7	In vitro models of TLR9 stimulation	NIH, AG20245
Current	Shleshm a Dhakal	Pre	2014- 2015	BA	2013	City College of New York- CUNY	Role of Microglia/Macrophages in AD Pathogenesis	NIH, AG20245, Seix Dow Foundation

11/26/2014

Thomas Wisniewski MD

Bibliography:**Peer Reviewed Original Data Journal Publications (Abstracts are not listed. Reviews, books and book chapters are listed separately)**

1. Moon HM, **Wisniewski T**, Mertz P, DeMartini J, Wisniewski HM. Purification of neurofilament subunits from bovine brains and studies on neurofilament assembly. *Journal of Cell Biology* 1981; 89:560-567.
2. Kitaguchi T, Wisniewski KE, Maslinska S, Maslinska D, **Wisniewski TM**. β -Amyloid immunoreactivity in patients with neuronal ceroid lipofuscinosis: ultrastructural and biochemical demonstration. *Neuroscience Letters* 1990; 112:155-160.
3. Onesti S, **Wisniewski T**, Post K. Clinical versus subclinical pituitary apoplexy: presentation, surgical management and outcome in 21 patients. *Neurosurgery* 1990; 26:980-986.
4. Onesti S, **Wisniewski T**, Post K. Pituitary apoplexy associated with a Rathke's cleft cyst. *Neurosurgery* 1990; 27:644-646.
5. **Wisniewski T**, Sisti M, Inhirami G, Knowles D, Powers J. Solitary intracranial plasmacytoma: immunohistochemical and molecular studies. *Neurosurgery* 1990; 27:826-829.
6. Kitaguchi T, Wisniewski KE, Maslinski S, Maslinska D, **Wisniewski TM**, Kim KS. Beta-protein immunoreactivity in brains of patients with neuronal ceroid lipofuscinosis: ultrastructural and biochemical demonstration. *Neuroscience Letters* 1990, 112:155-160.
7. **Wisniewski T**, Haltia M, Ghiso J, Frangione B. Lewy bodies are immunoreactive with antibodies raised to gelsolin related amyloid. *American Journal of Pathology* 1991; 138:1077-1083.
8. Castano EM, **Wisniewski T**, Frangione B. Inherited amyloids of the nervous system. *Current Opinion in Neurobiology* 1991; 1:448-454.
9. Haltia M, Ghiso J, Miller D, Frangione B, **Wisniewski T**. Gelsolin variant and β -amyloid co-occur in a case of Finnish amyloidosis and Alzheimer's. *Neurobiology of Aging* 1991; 12:313-316.
10. **Wisniewski T**, Ghiso J, Frangione B. Peptides homologous to the amyloid protein of Alzheimer's disease containing a glutamine for glutamic acid substitution have

11/26/2014

Thomas Wisniewski MD

accelerated amyloid fibril formation. *Biochemical and Biophysical Research Communications* 1991; 179:1247-1254.

11. Constantinidis J, **Wisniewski TM**. The dominant form of the pigmentary orthochromatic leukodystrophy. *Acta Neuropathologica* 1991; 82:483-487.
12. **Wisniewski T**, Haltia M, Ghiso J, Frangione B. Lewy bodies and gelsolin. *Parkinson/Alzheimer Digest* 1992; 1:6-8.
13. Iwaki T, **Wisniewski T**, Iwaki A, Corbin E, Tomokane N, Tateishi J, Goldman JE. Accumulation of α B-crystallin in central nervous system glia and neurons in pathological conditions. *American Journal of Pathology* 1992; 140:345-356.
14. Ghiso J, **Wisniewski T**, Vidal R, Rostagno A, Frangione B. Epitope mapping of two polyclonal antibodies that recognize amyloid lesions in patients with Alzheimer's disease. *The Biochemical Journal* 1992; 282:517-522.
15. **Wisniewski T**, Frangione B. Apolipoprotein E: a pathological chaperone in systemic and cerebral amyloidoses. *Neuroscience Letters* 1992; 135:235-238.
16. Constantinidis J, Wisniewski KE, **Wisniewski TM**. Senile neuronal ceroid lipofuscinosis, a report of three cases and a review of the literature. *Acta Neuropathologica* 1992; 83:461-468.
17. **Wisniewski T**, Frangione B. Molecular biology of the Dutch variant of Alzheimer's disease. *Molecular Biology* 1992; 6:75-86.
18. Rodrigues M, Rajagopalan S, Jones K, Nirankari V, **Wisniewski T**, Frangione B, Gorevic P. Gelsolin immunoreactivity in corneal amyloid, macular and granular dystrophies and wound healing. *American Journal of Ophthalmology* 1993; 115:644-652.
19. **Wisniewski T**, Golabek A, Matsubara E, Ghiso J, Frangione B. Apolipoprotein E: binding to soluble β -amyloid. *Biochemical Biophysical Research Communications* 1993; 192:359-365.
20. Ghiso J, Matsubara E, Koudinov A, **Wisniewski T**, Frangione B. Alzheimer's amyloid β specifically binds SP40,40 (Apolipoprotein J), an inhibitor of the complement membrane attack complex. *The Biochemical Journal* 1993; 293:27-30.
21. **Wisniewski T**, Castano E, Ghiso J, Frangione B. Cerebrospinal fluid inhibits fibrillogenesis by Alzheimer's disease peptides. *Annals of Neurology* 1993; 34:

11/26/2014

Thomas Wisniewski MD

631-633.

22. **Wisniewski T**, Ghiso J, Frangione B. Alzheimer's disease and soluble A β . *Neurobiology of Aging* 1994; 15:143-152.
23. **Wisniewski T**, Lalowski M., Levy E., Marques M.R.F., Frangione B. The amino acid sequence of neuritic plaque amyloid from a familial Alzheimer's disease patient. *Annals of Neurology* 1994; 35:245-246.
24. Kida E, Golabek A, **Wisniewski T**, Wisniewski K. Regional differences of Apolipoprotein E immunoreactivity in diffuse plaques in Alzheimer's disease brain. *Neuroscience Letters* 1994; 167: 73-76.
25. Sanan DA, Weisgraber KH, Mahley RW, Huang D, Saunders A, Schmechel D, **Wisniewski T**, Frangione B, Roses A, Strittmatter WJ. Apolipoprotein E associates with β Amyloid peptide of Alzheimer's Disease to form novel monofibrils: Isoform Apo E4 associates more efficiently than Apo E3. *Journal of Clinical Investigation* 1994; 94:860-869.
26. Gallo G, **Wisniewski T**, Choi-Miura N, Ghiso J, Frangione B. Potential role of Apolipoprotein E in fibrillogenesis. *American Journal of Pathology* 1994; 145:1-5.
27. **Wisniewski T**, Castano EM, Golabek A, Vogel T, Frangione B. Acceleration of Alzheimer's fibril formation by apolipoprotein E in vitro. *American Journal of Pathology* 1994; 145:1030-1035.
28. Zlokovic BV, Martel CL, Mackic JB, Matsubara E, **Wisniewski T**, McComb G, Frangione B, Ghiso J. Brain uptake of circulating apolipoprotein J and E complexed to Alzheimer's amyloid β . *Biochemical Biophysical Research Communications* 1994; 205:1431-1437.
29. **Wisniewski T**, Morelli L, Wegiel J, Levy E, Wisniewski HM, Frangione B. The influence of apolipoprotein E isotype on Alzheimer's disease pathology in 40 cases of Down's syndrome. *Annals of Neurology* 1995; 36:137-139.
30. Mangone C, Castano E, Levy E, Abiusi G, **Wisniewski T**, Marques M, Faccio E, Gorelick P, Frangione B, Sica R. Early onset Alzheimer's disease in a South American pedigree. Clinical, SPECT, immunohistochemical and DNA findings. *Acta Neurologica Scandinavica* 1995; 91:6-13.
31. Ghiso J, Plant GT, Revesz T, **Wisniewski T**, Frangione B. Familial cerebral angiopathy

11/26/2014

Thomas Wisniewski MD

- (British type) with nonneuritic amyloid plaque formation may be due to a novel amyloid protein. *Journal of Neurological Sciences* 1995; 129: 74-7.
32. Castano EM, Prelli F, **Wisniewski T**, Golabek A, Kumar RA, Soto C, Frangione B. Fibrillogenesis of Alzheimer's Amyloid β peptides and apolipoprotein E. *Biochemical Journal* 1995; 306:599-60.
 33. Golabek A, Marques MA, Lalowski M, **Wisniewski T**. Alzheimer's Disease amyloid binding proteins in vitro and in normal human cerebrospinal fluid. *Neuroscience Letters* 1995; 191:79-82.
 34. **Wisniewski T**, Golabek AA, Kida E, Wisniewski KE, Frangione B. Conformational mimicry in Alzheimer's disease. *American Journal of Pathology* 1995; 147:238-244.
 35. **Wisniewski T**, Lalowski M, Golabek A, Frangione B. Alzheimer's Disease: An apolipoprotein E amyloidosis? *The Lancet* 1995; 345: 956-958.
 36. **Wisniewski T**, Frangione B. Amyloidosis in Alzheimer's disease. *The Lancet* 1995; 346: 441.
 37. **Wisniewski T**, Palha JA, Ghiso J, Frangione B. S182 protein in Alzheimer's disease neuritic plaques. *The Lancet*, 1995 346:1366.
 38. **Wisniewski T**, Lalowski M, Bobik M, Russell M, Strosznajder J, Frangione B. Amyloid β 1-42 deposits do not lead to Alzheimer's neuritic plaques in aged dogs. *Biochemical Journal* 1996; 313: 575-580.
 39. **Article Featured on Cover:** Vidal R, Garzuly F, Budka H, Lalowski M, Linke RP, Britting F, Frangione B, **Wisniewski T**. Meningovascular amyloidosis associated with a novel transthyretin (TTR) missense mutation at codon 18 (TTRD18G). *American Journal of Pathology* 1996;148: 361-366.
 40. **Wisniewski T**, Lalowski M, Baumann M, Rauvala H, Raulo E, Nolo R, Frangione B. HB-GAM is a cytokine present in Alzheimer's and Down's Syndrome Lesions. *Neuroreport* 1996; 7: 667-671.
 41. Baumann MH, **Wisniewski T**, Plant GT, Levy E, Ghiso J. Identification of C-terminal fragments of α - and β -tubulin in amyloid deposits of the familial cerebral amyloid angiopathy, British type. *Biochemical Biophysical Research Communications* 1996; 219: 238-242.
 42. Baumann MH, Golabek A, Lalowski, **Wisniewski T**. Micropreparative gel

11/26/2014

Thomas Wisniewski MD

- electrophoresis of small molecular weight peptides: purification of highly insoluble amyloid peptide fragments. *Analytical Biochemistry* 1996; 236: 191-198.
43. Soto C, Golabek A, **Wisniewski T**, Castano EM. Alzheimer's soluble β -amyloid is conformationally modified by apolipoprotein E in vitro. *Neuroreport* 1996; 7: 721-725.
 44. Palha JA, Moreira P, **Wisniewski T**, Frangione B, Saraiva MJ. Transthyretin gene in Alzheimer's disease patients. *Neuroscience Letters* 1996; 204: 212-214.
 45. Golabek A, Soto C, Vogel T, **Wisniewski T**. The interaction between apolipoprotein E and Alzheimer's amyloid β -peptide is dependent on β -peptide conformation. *The Journal of Biological Chemistry* 1996; 271: 10602-10606.
 46. Lemere CA, Blusztajn JK, Yamaguchi H, **Wisniewski T**, Saido T, Selkoe D. Sequence of deposition of heterogeneous amyloid β -peptides and apo E in Down syndrome: implications for initial events in amyloid plaque formation. *Neurobiology of Disease* 1996; 3:16-32.
 47. Vidal R, Ghiso J, **Wisniewski T**, Frangione B. Alzheimer's presenilin 1 gene expression in platelets and megakaryocytes: Identification of a novel splice variant. *FEBS Letters* 1996; 393: 19-23.
 48. Garzuly F, **Wisniewski T**, Brittig F, Budka H. Familial meningocerebrovascular amyloidosis, Hungarian type, with mutant transthyretin (TTR Asp18Gly). *Neurology*, 47: 1562-1567, 1996.
 49. Lalowski M, Golabek A, Lemere CA, Selkoe DJ, Wisniewski HM, Beavis RC, Frangione B, **Wisniewski T**. The "non-amyloidogenic" p3 fragment (amyloid β 17-42) is a major constituent of Down syndrome cerebellar preamyloid. *Journal of Biological Chemistry*, 271: 33623-33631, 1996.
 50. Palha JA, Moreira P, **Wisniewski T**, Frangione B, Saraiva MJ. C for T substitution at codon 108: the first identified silent mutation in the transthyretin gene. *Amyloid: International Journal of Experimental Clinical Investigation*, 4:52-53, 1997.
 51. Ghiso J, Calero M, Matsubara E, Governale S, Chuba J, Beavis R, **Wisniewski T**, Frangione B. Alzheimer's soluble amyloid β is a normal component of human urine. *FEBS Letters*, 408: 105-108, 1997.
 52. **Wisniewski T**, Dowlat W, Permanne B, Palha J, Kumar A, Gallo G, Frangione B.

11/26/2014

Thomas Wisniewski MD

- Presenilin is associated with Alzheimer's disease amyloid. *American Journal of Pathology*, 151: 601-610, 1997.
53. Permanne B, Perez C, Soto C, Frangione B, **Wisniewski T**. Detection of apolipoprotein E/dimeric soluble amyloid β complexes in Alzheimer's disease brain supernatants. *Biochem. Biophys. Res. Commun.*, 240: 715-720, 1997.
54. **Wisniewski T**, Dowjat WK, Buxbaum JD, Khorhova O, Efthimiopoulos S, Kulczycki J, Lojkowska W, Wegiel J, Wisniewski HM, Frangione B. A novel Polish presenilin-1 mutation (P117L) is associated with familial Alzheimer's disease and leads to death as early as the age of 28 years. *NeuroReport*, 9: 217-221, 1998.
55. K.E. Wisniewski, N.Zhong, W. Kaszmarski, A. Kaszmarski, E. Kida, W.T. Brown, K.O. Schwartz, E.S. Stenroos, A.M. Lazzarini, A.J. Rubin, W.G. Johnson, **T.M. Wisniewski**. Compound heterozygous genotype is associated with protracted juvenile neuronal ceroid lipofuscinosis. *Annals of Neurology*, 43: 106-110, 1998.
56. Askanas V, King Engel W, Chih-Chao Y, Alvarez R B, Lee VMY, **Wisniewski T**. Light and electron microscopic immunolocalization of presenilin I in abnormal muscle fibers of patients with sporadic inclusion-body myositis and autosomal recessive inclusion body myopathy. *American Journal of Pathology*, 152: 889-895, 1998.
57. **Wisniewski T**, Goldman JE. α B-Crystallin is associated with intermediate filaments in astrocytoma cells. *Neurochemistry Research*, 23: 389-396, 1998.
58. Wegiel J, Wisniewski HM, Izabela K, Michal T, Eulalia B, Irene P, Jerzy K, Wieslaw D, **Wisniewski T**. Cell-type specific enhancement of amyloid β deposition in a novel presenilin-1 mutation (P117L). *Journal of Neuropathology and Experimental Neurology*, 57: 831-838, 1998.
59. Pomara N, Shao B, **Wisniewski T**, Mehta PD. Decreases in plasma A β 1-40 levels with aging in non-demented elderly with apoE-epsilon 4 allele. *Neurochemistry Research*, 23: 1563-1566, 1998.
60. Efthimiopoulos S, Floor E, Georgakopoulos A, Shior J, Cui W, Yasothornsrikul S, Hook VYH, **Wisniewski T**, Buee L, Robakis NK. Enrichment of Presenilin 1 peptides in neuronal large dense core and somatodendritic clathrin coated vesicles. *Journal of Neurochemistry*, 71: 2365-2372, 1998.
61. Copp RP, **Wisniewski T**, Hentati F, Larnaout A, Hamida MB, Kayden HJ. Localization of α -tocopherol transfer protein in the brains of patients with ataxia with vitamin E deficiency and other oxidative stress related neurodegenerative disorders. *Brain*

11/26/2014

Thomas Wisniewski MD

Research, 822: 80-87, 1999.

62. Aucouturier P, Kascak RJ, Frangione B, **Wisniewski T**. Biochemical and conformational variability of human prion strains in sporadic Creutzfeldt-Jakob disease. *Neuroscience Letters*, 274(1):33-36, 1999.
63. Dowjat WK, **Wisniewski T**, Efthimiopoulos S, Wisniewski HM. Inhibition of neurite outgrowth by Familial Alzheimer's disease linked presenilin-1 mutations. *Neuroscience Letters*, 267: 141-144, 1999.
64. Stoltner, SE, Grenfell TJ, Mori C, Wisniewski KE, **Wisniewski TM**, Selkoe DJ, Lemere CA. Temporal accrual of complement proteins in amyloid plaques in Down syndrome with Alzheimer's disease. *American Journal of Pathology*, 156: 489-499, 2000.
65. Soto C, Kacsak RJ, Saborio GP, Aucouturier P, **Wisniewski T**, Prelli F, Kacsak R, Mendez E, Kumar A, Harris DA, Ironside J, Tagliavini F, Carp RI, Frangione B. Reversion of prion protein conformational changes by synthetic β -sheet breaker peptides. *The Lancet*, 355: 192-197, 2000.
66. Sigurdsson EM, Permanne B, Soto C, **Wisniewski T**, Frangione B. In Vivo Reversal of Amyloid β Lesions in Rat Brain, *Journal of Neuropathology and Experimental Neurology*, 59: 11-17, 2000.
67. Golabek AA, Kida E, Walus M, Perez C, **Wisniewski T**, Soto C. Sodium dodecyl sulfate-resistant complexes of Alzheimer's amyloid β -peptide with the N-terminal, receptor binding domain of apolipoprotein E. *Biophysical Journal*, 79: 1008-1015, 2000.
68. Ji Y, Permanne B, Sigurdsson EM, Holtzman DM, **Wisniewski T**. Amyloid β 40/42 clearance across the blood-brain barrier following intra-ventricular injections in wild-type, apoE knock-out and human apoE3 or E4 expressing transgenic mice. *Journal of Alzheimer's Disease*, 3: 23-30, 2001.
69. Poeggeler, B, Miravalle,L, Zagorski M, **Wisniewski T**, Chyan YJ, ZhangY, Shao H, Bryant-Thomas T, Vidal R, Frangione B, Ghiso J, Pappolla MA. Melatonin reverses the pro-fibrillrogenic effects of apolipoprotein E4 on the Alzheimer's β -amyloid protein. *Biochemistry*, 40: 14995-15001, 2001.
70. Dowjat WK, Wisniewski H, **Wisniewski T**. Alzheimer's disease presenilin-1 expression modulates the assembly of neurofilaments. *Neuroscience*, 103: 1-8, 2001.

11/26/2014

Thomas Wisniewski MD

71. Kulczycki J, Bertrand E, Lojkowska W, Dowjat W, **Wisniewski T**, Lyxzywek-Zwierz M. Familial Alzheimer's disease connected with a mutation in presenilin gene 1. *Neurologia I Neurochirurgia Polska*, 35: 213-224, 2001.
72. Aucouturier P, Geissmann F, Saborio G, Meeker HC, Damotte D, Kacsak R, Kacsak R, Carp RI, **Wisniewski T**. Scrapie neuroinvasion in RAG-1^{0/0} mice by transfer of infected splenic dendritic cells. *Journal of Clinical Investigation*, 108: 703-708, 2001.
73. Wegiel J, Bobinski M, Tarnawski M, Dziewiatowski J, Popovitch E, Miller DC, **Wisniewski T**, Golomb J, de Leon MJ, Reisberg B. Fibrillar amyloid- β affects neurofibrillary changes but only in neurons already involved in neurofibrillary degeneration. *Acta Neuropathology* 101: 585-590, 2001.
74. Sigurdsson EM, Scholtzova H, Mehta PD, Frangione B, **Wisniewski T**. Immunization with a non-toxic/non-fibrillar amyloid- β homologous peptide reduces Alzheimer's disease associated pathology in transgenic mice. *American Journal of Pathology*, 159: 439-447, 2001.
75. Wen PH, Shao X, Shao Z, Hof PR, **Wisniewski T**, Kelley K, Friedrich VL, Ho L, Painetti GM, Robakis NK, Elder GA. Overexpression of wild type but not an FAD mutant presenilin-1 promotes hippocampal neurogenesis in adult mice, *Neurobiology of Disease*, 10: 8-19, 2002.
76. Mori C, Spooner ET, Wisniewski KE, **Wisniewski TM**, Yamaguchi H, Saido TC, Li C, Tolan DR, Selkoe DJ, Lemere CA. Intraneuronal A β 42 accumulation in Down syndrome brain. *Amyloid*, 9:88-102, 2002.
77. Wang ZH, Ji Y, Zeng B, Rakasawan N, Pastores GM, Ong E, **Wisniewski T**, Kolodny EH. Therapeutic effects of astrocytes expressing both tyrosine hydroxylase and brain-derived neurotrophic factor on a rat model with Parkinson's disease. *Neuroscience*, 113: 629-640, 2002.
78. Mackic JB, Bading J, Ghiso J, Walker L, **Wisniewski T**, Frangione B, Zlokovic BV. Transport across the blood-brain barrier and differential cerebrovascular sequestration of circulating Alzheimer's amyloid- β peptide in aged Rhesus vs. aged Squirrel monkeys. *Vascular Pharmacology*, 38: 303-313, 2002.
79. Poduslo JF, Wengenack TM, Curran GL, **Wisniewski T**, Sigurdsson E, Macura SI, Borowski BJ, Jack CR. Molecular contrast enhanced magnetic resonance imaging of Alzheimer's amyloid plaques. *Neurobiology of Disease*, 11: 315-329, 2002.

11/26/2014

Thomas Wisniewski MD

80. De Leon MJ, Segal S, Tarshish C, DeSanti S, Zinkowski R, Mehta PD, Convit A, Caraos C, Rusinek H, Tsui W, Saint Louis LA, DeBarnardis J, Kerkmanand D, Qadri F, Gary A, Lesbre, **Wisniewski T**, Poirier J, Davies P. Longitudinal Tau levels increase in mild cognitive impairment. *Neuroscience Letters*, 333: 183-186, 2002.
81. Marambaud P, Shioi J, Serban G, Georgakopoulos A, Sarner S, Nagy V, Wen P, Efthimiopoulos S, **Wisniewski T**, Robakis NK. A presenilin-1 mediated γ -secretase activity cleaves cadherins and controls disassembly of adherens junctions. *EMBO Journal*, 21: 1948-1956, 2002.
82. Wegiel J, Kuchna I, **Wisniewski T**, de Leon MJ, Reisberg B, Pirttila T, Kivimaki T, Lehtimaki. Vascular fibrosis and calcification in the hippocampus in aging, Alzheimer's disease and Down syndrome. *Acta Neuropathologica*, 103: 333-343, 2002.
83. Sigurdsson E, Brown DR, Daniels M, Kacsak RJ, Kacsak R, Carp R, Meeker HC, Frangione B, **Wisniewski T**. Vaccination delays the onset of prion disease in mice. *American Journal of Pathology*, 161: 13-17, 2002.
84. Wong BS, Li R, Sasoon J, Liu T, Pan T, Kang SC, **Wisniewski T**, Brown DR, Sy MS. Mapping the antigenicity of copper-treated cellular prion protein with the scrapie isoform. *Cellular and Molecular Life Sciences*, 60: 1224-1234, 2003.
85. Sigurdsson EM, Sy MS, Li R, Scholtzova H, Kacsak RJ, Kacsak R, Carp RI, Meeker HC, Frangione B, **Wisniewski T**. Anti-PrP antibodies for prophylaxis following prion exposure. *Neuroscience Letters*, 336: 185-187, 2003.
86. Zaim Wadghiri Y, Sigurdsson EM, Sadowski M, Elliot JI, Li Y, Scholtzova H, Tang CY, Aguilaldo G, Pappolla M, Duff K, **Wisniewski T***, Turnbull DH* (*joint senior authors). Detection of Alzheimer's amyloid in transgenic mice using magnetic resonance micro-imaging. *Magnetic Resonance in Medicine*, 50: 293-302, 2003.
87. Ji Y, Gong Y, Gan W, Beach T, Holtzman DM, **Wisniewski T**. Apolipoprotein E isoform-specific regulation of dendritic spine morphology in apolipoprotein E transgenic mice and Alzheimer's disease patients. *Neuroscience*, 122: 305-315, 2003.
88. Sadowski M, Tang CY, Aguilaldo G, Carp R, Meeker HC, **Wisniewski T**. *In vivo* magnetic resonance imaging signal changes in scrapie infected mice. *Neuroscience Letters*, 345: 1-4, 2003.
89. Sigurdsson EM, Brown D, Alim MA, Scholtzova H, Carp R, Meeker HC, Prelli F,

11/26/2014

Thomas Wisniewski MD

- Frangione B, **Wisniewski T.** Copper chelation delays the onset of prion disease. *Journal of Biological Chemistry*, 278: 46199-46202, 2003.
90. Kang SC, Brown DR, Whiteman M, Li R, Pan T, Perry G, **Wisniewski T**, Sy MS, Wong BS. Prion protein is ubiquitinated after developing protease resistance in the brains of scrapie infected mice. *Journal of Pathology*, 203: 603-608, 2004.
91. Pan T, Li R, Kang SC, Wong BS, **Wisniewski T**, Sy MS. Epitope scanning reveals gain and loss of strain specific antibody binding epitopes associated with the conversion of normal cellular prion to scrapie prion. *Journal of Neurochemistry*, 90: 1205-1217, 2004.
92. Wegiel J, Kuchna I, Novicki K, Dowjat K, Reisberg B, DeLeon M, **Wisniewski T**, Chen-Hwang MC, Hwang YW. Cell type and brain structure specific patterns of distribution of minibrain kinase in human brain. *Brain Research*, 1010: 69-80, 2004.
93. Dowjat WK, Kuchna I, **Wisniewski T**, Wegiel J. A novel highly pathogenic Alzheimer presenilin-1 mutation in codon 117 (P117S): Comparison of clinical, neuropathological and cell culture phenotypes of Pro117Leu and Pro117Ser mutations. *Journal of Alzheimer's Disease*, 6: 31-43, 2004
94. Sadowski M, Pankiewicz J, Scholtzova H, Ji Y, Quartermain D, Jensen C, Duff K, Nixon RA, Gruen RJ, **Wisniewski T**. Decreased hippocampal glucose metabolism correlates with neuronal loss and impaired recall in Alzheimer's disease model mice. *Journal of Neuropathology and Experimental Neurology*, 63: 418-428, 2004.
95. Sadowski M, Pankiewicz J, Scholtzova H, Li Y, Quartermain D, Duff K, **Wisniewski T**. Links between the pathology of Alzheimer's disease and vascular dementia. *Neurochemical Research*, 29: 1251-1260, 2004.
96. Helpern JA, Falangola MF, Dyakin VV, Lee SP, Bogart A, Estok K, Ardekani B, Duff K, Branch C, **Wisniewski T**, De Leon MJ, Wolf O, O'Shea J, Wegiel J, Nixon RA. Magnetic resonance imaging assessment of neuropathology in a transgenic mouse model of Alzheimer's disease. *Magnetic Resonance in Medicine*, 51: 794-798, 2004.
97. Sadowski M, Pankiewicz J, Scholtzova H, Ripellino JA, Li Y, Schmidt SD, Mathews PM, Fryer JD, Holtzman DM, Sigurdsson EM, **Wisniewski T**. Blocking the apolipoprotein E/ β -amyloid interaction reduces β -amyloid toxicity and decreases β -amyloid load in transgenic mice. *American Journal of Pathology*, 165: 937-948,

11/26/2014

Thomas Wisniewski MD

2004.

98. Sigurdsson EM, Knudsen E, Asuni A, Sage D, Goni F, Quartermain D, Frangione B, **Wisniewski T**. Enhanced cognition with a reduced immune response in an AD mouse model immunized with A β derivatives. *Journal of Neuroscience*, 24: 6277-6282, 2004.
99. Sadowski M, Pankiewicz J, Scholtzova H, Tsai J, Li Y, Carp RI, Meeker HC, Gambetti P, Debnath M, Mathis CA, Li S, Gan WB, Klunk WE, **Wisniewski T**. Targeting prion amyloid deposits in vivo using methoxy-X04, *Journal of Neuropathology and Experimental Neurology*, 63: 775-784, 2004.
100. Pan T, Wong P, Chang B, Li C, Li R, Kang SC, **Wisniewski T**, Sy MS. Biochemical fingerprints of prion infection: accumulations of aberrant full-length and N-terminally truncated PrP species are common features in mouse prion disease. *Journal of Virology*, 79: 934-943, 2005
101. Goni F, Knudsen E, Schreiber F, Scholtzova H, Pankiewicz J, Carp R, Meeker HC, Rubenstein R, Brown DR, Chabalgoity JA, Sigurdsson EM, **Wisniewski T**. Mucosal vaccination delays or prevents prion infection via an oral route. *Neuroscience*, 133: 413-421, 2005.
102. Pan T, Chang B, Wong P, Li C, Li R, Kang SC, Thompsett AR, Po T, Yin S, Barnard G, McConnell I, Brown DR, **Wisniewski T**, Sy MS. An aggregate specific ELISA: Detection of conformational differences between recombinant PrP protein dimers and PrP^{Sc} aggregates. *Journal of Virology*, 79: 12355-12364., 2005.
103. Pankiewicz J, Prelli F, Sy MS, Kacsak RJ, Kacsak RB, Spinner DS, Carp RI, Meeker HC, Sadowski M, **Wisniewski T**. Clearance and prevention of prion infection in cell culture by anti-PrP antibodies. *European Journal of Neuroscience*, 23: 2635-2647, 2006.
104. Leal MC, Dorfman VB, Gamba GF, Frangione B, **Wisniewski T**, Castano EM, Sigurdsson EM, Morelli L. Plaque-Associated Overexpression of Insulin-Degrading Enzyme in the Cerebral Cortex of Aged Transgenic Tg2576 Mice With Alzheimer Pathology. *Journal of Neuropathology and Experimental Neurology*, 65: :976-987, 2006.
105. Sadowski MJ, Pankiewicz J, Scholtzova H, Mehta PD, Prelli F, Wen P, Quartermain D, **Wisniewski T**. Blocking the Apolipoprotein E/Amyloid- β Interaction as a Potential Therapeutic Approach for Alzheimer's Disease. *Proceedings of the National Academy of Science*, 99: 18787-18792, 2006.

11/26/2014

Thomas Wisniewski MD

106. Asuni A, Boutajangout A, Scholtzova H, Knudsen E, Li Y, Quartermain D, Frangione B, **Wisniewski T**, Sigurdsson EM. A β derivative vaccination in alum adjuvant prevents amyloid deposition and does not cause brain microhemorrhages in Alzheimer's model mice. *European Journal of Neuroscience*, 24: 2530-2542, 2006.
107. Chang B, Cheng X, Yin S, Pan T, Zhang H, Wong P, Kang SC, Xiao F, Yan H, Li C, Wolfe LL, Miller MW, **Wisniewski T**, Greene MI, Sy MS. A blood test for prion: disease associated prion aggregates detected in the blood of infected but asymptomatic animals. *Clinical and Vaccine Immunology*, 14: 36-43, 2007
108. Spinner DS, Kacsak RB, LaFauci G, Meeker HC, Xuemin Y, Flory MJ, Kim JI, Schuller-Levis GB, Levis WR, **Wisniewski T**, Carp RI, Kacsak RJ. CpG Oligodeoxynucleotide-enhanced humoral immune response and production of antibodies to prion protein PrP^{Sc} in mice immunized with 139A scrapie-associated fibrils. *Journal of Leukocyte Biology*, 14(1):36-43, 2007
109. Wegiel J, Kuchna I, Nowicki K, Frackowiak J, Mazur-Kolecka B, Imaki H, Wegiel J, Mehta PD, Silverman WP, Reisberg B, deLeon M, **Wisniewski T**, Pirtilla T, Frey H, Lehtimaki T, Kivimaki T, Visser FE, Kamphorst W, Potempaska A, Bolton D, Currie JR, and Miller DL. Intraneuronal Abeta immunoreactivity is not a predictor of brain amyloidosis-beta or neurofibrillary degeneration. *Acta Neuropathologica (Berl)*, 113(4):389-402, 2007
110. Litterst C, Georgakopoulos A, Shioi J, Ghersi E, **Wisniewski T**, Wang R, Ludwig A, Robakis NK. Ligand binding and calcium influx induce distinct ectodomain/gamma -secretase processing pathways of EPHB2 receptor. *Journal of Biological Chemistry* 282(22):16155-63, 2007.
111. Webb S, Lekishvili T, Loeschner C, Sellarajah S, Prelli F, **Wisniewski T**, Gilbert IM, Brown DR. Mechanistic insights into prion curing by novel anti-prion compounds. *Journal of Virology*, 81: 10729-10741, 2007.
112. Li Q, Min J, Namm J, Kim EM, Ji Y, Wu H, **Wisniewski T**, Chang YT. Styryl based in vivo imaging agents for β -amyloid plaques. *ChemBioChem*, 8(14): 1679-1687, 2007.
113. Gambetti P, Dong Z, Yuan J, Xiao X, Zheng M, Alsheklee A, Castellani R, Cohen M, Marder K, Harris C, Montine T, **Wisniewski T**, Dickson DW, Hulette CM, DeArmond SJ, Mastrianni JA, Kong Q, Zou WQ. A novel human prion disease with protease-sensitive prion. *Annals of Neurology*, 63: 697-708, 2008.

11/26/2014

Thomas Wisniewski MD

114. Klybin I, Betts V, Blennow K, Zetterberg H, Wallin A, Lemere CA, Cullen WK, Welzel A, Peng Y, **Wisniewski T**, Selkoe DJ, Anwyl R, Walsh DM, Rowan MJ. A β dimer-containing human cerebrospinal fluid disrupts synaptic plasticity: prevention by systemic passive immunization. *Journal of Neuroscience*, 28: 4231-4237, 2008.
115. Firuzi O, Zhuo J, Chinnici CM, **Wisniewski T**, Pratico D. 5-lipoxygenase gene disruption reduces amyloid- β pathology in a mouse model of Alzheimer's disease. *FASEB Journal*, 22: 1169-1178, 2008.
116. Sigurdsson EM, Wadghiri YZ, Mosconi L, Blind JA, Knudsen E, Asuni A, Tsui WH, Sadowski M, Turnbull DH, de Leon M, **Wisniewski T**. A non-toxic ligand for voxel-based MRI analysis of plaques in AD transgenic mice. *Neurobiology of Aging*, 29: 836-847, 2008.
117. Goni F, Chabalgoity JA, Prelli F, Schreiber F, Scholtzova H, Chung E, Kacsak R, Kacsak R, Brown DR, Sigurdsson EM, **Wisniewski T**. High titers of mucosal and systemic anti-PrP antibodies abrogates oral prion infection in mucosal vaccinated mice. *Neuroscience*, 153: 679-686, 2008.
118. Cercy SP, Sadowski MJ, **Wisniewski T**. Prominent neuroleptic sensitivity in a case of early-onset Alzheimer's disease due to Presenilin-1 G206A mutation. *Cognitive and Behavioral Neurology*, 21(3):190-195, 2008.
119. Spinner DS, Cho IS, Park SY, Kim JI, Meeker HC, Ye X, LaFauci G, Kerr DJ, Flory MJ, Kim BS, Kacsak RB, **Wisniewski T**, Levis WR, Schuller-Levis GB, Carp RI, Park E, Kacsak RJ. Accelerated prion disease pathogenesis in the absence of Toll-like receptor 4 (TLR4) signaling. *Journal of Virology*, 82(21):10701-10708, 2008.
120. Wegiel J, Dowjat K, Kaczmarek W, Kuchna I, Nowicki K, Frackowiak J, Mazur Kolecka B, Wegiel J, Silverman WP, Reisberg B, DeLeon M, **Wisniewski T**, Gong CX, Liu F, Adayev T, Chen-Hwang MC, Hwang YW. The role of overexpressed DYRK1A protein in the early onset of neurofibrillary degeneration in Down syndrome. *Acta Neuropathology*, 116(4):391-407, 2008.
121. H. Scholtzova, Y. Z. Wadghiri, M. Douadi, E. M. Sigurdsson, Y. Li, D. Quartermain, P. Banerjee, and **T. Wisniewski**. A NMDA receptor antagonist leads to behavioral improvement and amyloid reduction in Alzheimer's disease model transgenic mice shown by micro-magnetic resonance imaging. *Journal of Neuroscience Research*, 86 (12):2784-2791, 2008.

11/26/2014

Thomas Wisniewski MD

122. Trouche SG, Asuni A, Rouland S, **Wisniewski T**, Frangione B, Verdier JM, Sigurdsson EM, Mestre-Frances N. Antibody response and plasma A β 1-40 in young *Microcebus Murinus* primates immunized with A β 1-42 and its derivates. *Vaccine*, 27:957-964, 2009.
123. Zhan J, Brys M, Glodzik L, Tsui W, Javier E, Wegiel J, Kuchna I, Pirraglia E, Li Y, Mosconi L, Saint Louis LA, Switalski R, De Santi S, Kim BC, **Wisniewski T**, Reisberg B, Bobinski M, de Leon MJ. An entorhinal cortex sulcal pattern is associated with Alzheimer's disease. *Human Brain Mapping*, 30: 874-882, 2009.
124. Boutajangout A, Goni F, Knudsen E, Schreiber F, Asuni A, Quartermain D, Frangione B, Chabalgoity A, **Wisniewski T**, Sigurdsson EM. Diminished amyloid β burden in Tg2576 mice following a prophylactic oral immunization with a Salmonella based amyloid β derivative vaccine. *Journal of Alzheimer's Disease*, 18: 961-972, 2009.
125. Sadowski MJ, Pankiewicz J, Prelli F, Scholtzova H, Spinner DS, Kacsak RB, Kacsak RJ, **Wisniewski T**. Anti-PrP Mab 6D11 suppresses PrP $^{\text{Sc}}$ replication in prion infected myeloid precursor line FDC-P1/22L and in the lymphoreticular system in vivo. *Neurobiology of Disease*, 34: 267-278, 2009.
126. Mosconi,L.; Mistur,R.; Switalski,R.; Tsui,W.H.; Glodzik,L.; Li,Y.; Pirraglia,E.; De,Santi S.; Reisberg,B.; **Wisniewski,T.**; De Leon,M.J. FDG-PET changes in brain glucose metabolism from normal cognition to pathologically verified Alzheimer's disease. *European Journal of Nuclear Medicine and Molecular Imaging*, 36(5): 811-822, 2009.
This manuscript won the "Best Clinical Paper of 2009" award from Springer and the European Association of Nuclear Medicine.
127. Scholtzova H, Kacsak RJ, Bates KA, Boutajangout A, Kerr DJ, Meeker HC, Mehta PD, Spinner DS, **Wisniewski T**. Induction of Toll-like receptor 9 signaling as a method for ameliorating Alzheimer's disease related pathology, *Journal of Neuroscience*, 29: 1846-1854, 2009.
128. Wegiel J, Kuchna I, Nowicki K, Imaki H, Wegiel J, Marchi E, Ma SY, Chauhan A, Chauhan V, Bobrowicz TW, de Leon M, Louis LA, Cohen IL, London E, Brown WT, **Wisniewski T**. The neuropathology of autism: defects of neurogenesis and neuronal migration, and dysplastic changes, *Acta Neuropathol.*, 119: 755-770, 2010.
129. Zhang W, Li YS, Nardi MA, Dang S, Yang J, Li Z, Karpatkin S, **Wisniewski T**. Dissolution of arterial platelet thrombi in vivo with a bifunctional platelet

11/26/2014

Thomas Wisniewski MD

- GPIIIa49-66 ligand which specifically targets the platelet thrombus, *Blood*, 116: 2336-2344, 2010.
130. Goni F, Prelli F, Ji Y, Scholtzova H, Yang J, Sun Y, Liang FX, Kacsak R, Kacsak R, Mehta P, **Wisniewski T**. Immunomodulation Targeting Abnormal Protein Conformation Reduces Pathology in a Mouse Model of Alzheimer's Disease. *PLoS ONE*, 5(10): e13391, 2010.
 131. Chung E, Ji Y, Sun Y, Kacsak R, Kacsak R, Mehta P, Strittmatter SM, **Wisniewski T**. Anti-PrP^C monoclonal antibody infusion as a novel treatment for A β oligomer cognitive cognitive deficits. *BMC Neuroscience*, 11:130, 2010.
 132. Wegiel J, KaczmarSKI W, Barua M, Kuchna I, Nowicki K, Wang KC, Wegiel J, Yang S, Frackowiak J, Mazur-Kolecka B, Silverman WP, Reisberg B, Monteiro I, de Leon M, **Wisniewski T**, Dalton A, Lai F, Hwang YW, Adayev T, Liu F, Iqbal K, Iqbal IG, Gong CX. Link between DYRK1A overexpression and several-fold enhancement of neurofibrillary degeneration with 3-repeat tau protein in Down syndrome. *Journal of Neuropathology and Experimental Neurology*, 70(1):36-50, 2011.
 133. Yang J, Ji Y, Mehta P, Bates KA, Sun Y, **Wisniewski T**. Blocking the apolipoprotein E/amyloid β interaction reduces fibrillar vascular amyloid deposition and cerebral microhemorrhages in TgSwDI mice. *Journal of Alzheimer's Disease*, 24(2):269-285, 2011.
 134. Yang J, Zaim Wadghiri Y, Hoang DM, Tsui W, Sun Y, Chung E, Li Y, Wang A, de Leon M, **Wisniewski T**. Detection of amyloid plaques targeted by USPIO-A β 1-42 in Alzheimer's disease transgenic mice using magnetic resonance microimaging. *Neuroimage*, 55: 1600-1609, 2011.
 135. Dang S, Hong T, **Wisniewski T**, Zhang W. A novel strategy of dissolution of pre-existing platelet thrombus by synergistic administration of a low concentration of bifunctional antibodies against beta3 integrin. *PLoS ONE*, 6(10): e27012, 2011.
 136. Chung E, Prelli F, Dealler S, Lee WS, Chang YT, **Wisniewski T**. Styryl-based and Tricyclic Compounds as Potential Anti-Prion Agents. *PLoS ONE*, 6(9): e24844, 2011 (<http://dx.plos.org/10.1371/journal.pone.0024844>)
 137. Leal MC, Surace EI, Holgado MP, Ferrari CC Tarelli R, Pitossi F, **Wisniewski T**, Castano EM, Morelli L. Notch signaling proteins HES-1 and Hey-1 bind to insulin degrading enzyme (IDE) proximal promoter and repress its transcription

11/26/2014

Thomas Wisniewski MD

- and activity: implications for cellular A β metabolism. *BBA-Molecular Cell Research*, 1823(2): 227-235, 2012.
138. Pomara N, Bruno D, Sarreal AS, Hernando RT, Nierenberg J, Petkova E, Sidtis JJ, **Wisniewski T**, Mehta PD, Pratico D, Zetterberg H, Blennow K. Cerebrospinal fluid amyloid beta levels are lower and F2-isoprostanes higher in individuals with major depressive disorder. *American Journal of Psychiatry*, 169(5):523-30, 2012.
139. Wegiel J, Schanen NC, Cook EH, Sigman M, Brown WT, Kuchna I, Nowicki K, Wegiel J, Imaki H, Ma SY, Marchi E, Wierzba-Bobrowicz T, Chauhan A, Chauhan V, Cohen IL, London E, Flory M, Lach B, **Wisniewski T**. Differences between the patterns of developmental abnormalities in autism associated with duplications 15q11.2q13 and idiopathic autism. *Journal of Neuropathology and Experimental Neurology*, 71(5):382-397, 2012.
140. Chang B, Petersen R, **Wisniewski T**, Rubenstein R. Influence of Mabs on PrP^{Sc} formation using *in vitro* and cell-free systems. *PloS ONE*, 7(7): e41626, 2012.
141. Um JW, Nygaard HB, Heiss JK, Kostylev MA, Stagi M, Takahashi H, Vortmeyer A, **Wisniewski T**, Gunther EC, Strittmatter SM. Alzheimer amyloid- β oligomer bound to post-synaptic prion protein signals via Fyn to alter NMDA receptors, dendritic spines and seizures. *Nature Neuroscience*, 15(9): 1227-1235, 2012.
142. Zhang W, Dang S, Hong T, Tang J, Fan J, Bu D, **Wisniewski T**. A humanized single-chain antibody against beta 3 integrin inhibits pulmonary metastasis by preferentially fragmenting activated platelets in the tumor microenvironment. *Blood*, 120(14): 2889-2898, 2012.
143. Wegiel J, Frackowiak J, Kolecka BM, Schanen NC, Cook Jr EH, Sigman M, Brown WT, Kuchna I, Wegiel J, Nowicki K, Imaki H, Ma SY, Chauhan A, Chauhan V, Miller DL, Mehta PD, Cohen IL, London E, Reisberg B, de Leon MJ, **Wisniewski T**. Abnormal Intracellular Accumulation and Extracellular A β Deposition in Idiopathic and Dup 15 Autism. *PLoS ONE*, 7(5):e35414, 2012.
144. **Wisniewski T**, Newman K, Javitt NB. Alzheimer's disease: focus on desmosterol. *Journal of Alzheimer's Disease*, 33: 881-888, 2013.
145. Wadghiri YZ, Li J, Wang J, Hoang DM, Sun Y, Xu H, Tsui W, Li Y, Wang A, de Leon M, **Wisniewski T**. Detection of Amyloid Plaques Targeted by Bifunctional USPIO in Alzheimer's Disease Transgenic Mice using Magnetic Resonance Microimaging. *PLoS ONE*, 8(2):e57097, 2013.

11/26/2014

Thomas Wisniewski MD

146. Um JW, Kaufman AC, Kostylev M, Heiss JK, Stagi M, Takahashi H, Kerrisk ME, Vortmeyer A, **Wisniewski T**, Guther EC, Koleske J, Nygaard HB, Strittmatter SM. Metabotropic Glutamate Receptor 5 Mediates Signaling from Alzheimer A β Oligomer Bound to Prion Protein, *Neuron*, 79(5): 887-902, 2013.
147. Ji Y, Liu M, Huo YR, Liu S, Shi Z, Liu S, **Wisniewski T**, Wang J. Apolipoprotein E4 frequency is increased among frontotemporal dementia and Alzheimer's disease patients in a Chinese population. *Dementia and Geriatric Cognitive Disorders*, 36: 163-170, 2013.
148. Rubenstein R, Chiu A, Chang B, **Wisniewski T**. Influence of CD40 on Prion Disease and the Immune Response to Recombinant PrP. *Journal of Neuroimmunology*, 257 (1-2): 21-27, 2013.
149. Wegiel J, Kuchna I, Nowicki K, Imaki H, Wegiel J, Yong Ma S, Azmitia EC, Banerjee P, Flory M, Cohen IL, London E, Brown TW, Hare KC, **Wisniewski T**. Contribution of olivo-floccular circuitry developmental defects to atypical gaze in autism. *Brain Research*, 1512: 106-122, 2013.
150. Goni F, Herline K, Peyser D, Wong K, Ji Y, Sun Y, Mehta P, **Wisniewski T**. Immunomodulation Targeting Both A β and Tau Pathological Conformers Ameliorates Alzheimer's Disease Pathology in TgSwDI and 3xTg Mouse Models. *Journal of Neuroinflammation*, 10: 150, 2013.
150. Liu S, Breitbart A, Sun Y, Mehta PD, Boutajangout A, Scholtzova H, **Wisniewski T**. Blocking the Apolipoprotein E/Amyloid β Interaction in Triple Transgenic Mice Ameliorates Alzheimer's Disease Related Amyloid β and Tau Pathology. *Journal of Neurochemistry*, 128: 577-591, 2014.
152. Salloway S, Sperling R, Fox NC, Blennow K, Klunk W, Raskind M, Sabbagh M, Honig LS, Porsteinsson AP, Ferris S, Reichert M, Ketter N, Nejadnik B, Guenzler V, Miloskavsky M, Wang D, Lu Y, Lull J, Tudor IC, Liu E, Grundman M, Yuen E, Black R, Brashear HR; Bapineuzumab 301 and 302 Clinical Trial Investigators (including **Wisniewski T**) Two phase 3 trials of bapineuzumab in mild to moderate Alzheimer's disease. *New England Journal of Medicine*, 370(4): 322-333, 2014.
153. Iulita MF, Carmo SD, Ower A, Fortress A, Aguilar LF, Hanna M, **Wisniewski T**, Granholm AC, Buhusi M, Busciglio J, Cuello AC. Nerve Growth Factor Metabolic Dysfunction in Down's Syndrome Brains: a Cause for Cholinergic Degeneration? *Brain*, 137: 860-872, 2014.

11/26/2014

Thomas Wisniewski MD

154. Chung K, Boutajangout A, **Wisniewski T**, Chan J, Stopler T, Vincent N, Batchan M, D'Urso J, Lin Y, Kline R, Kamer A, Stone E, Yaghmoor F, Blanck T, Quartermain D, Bekker A, Haile M. The COX-2 Inhibitor Meloxicam Ameliorates Neuroinflammation and Depressive Behavior in Adult Mice After Splenectomy. *PLoS ONE*, under review.
155. Wegiel J, Flory M, Kuchna I, Nowicki K, Ma SY, Imaki H, Wegiel J, Cohen IL, London E, **Wisniewski T**, Brown WT. Stereological study of the neuronal number and volume of 38 brain subdivisions of subjects diagnosed with autism reveals significant alterations restricted to the striatum, amygdala and cerebellum. *Acta Neuropathologica Communications*, 2: 141, 2014.
156. Wegiel J, Flory M, Kuchna I, Nowicki N, Ma SY, Imaki H, Wegiel J, Cohen IL, London E, Brown WT, **Wisniewski T**. Brain-region-specific alterations of the trajectories of neuronal volume growth throughout the lifespan in autism. *Acta Neuropathologica Communications*, 2: 28, 2014.
157. Zhang Y, Shi Z, Liu M, Liu S, Yue W, Liu S, Xiang L, Lu H, Liu P, **Wisniewski T**, Wang J, Ji Y. Prevalence of cognitive impairment no dementia in a rural area of northern China. *Neuroepidemiology*, 42: 197-203, 2014.
158. Scholtzova H, Chianchiano P, Pan J, Sun Y, Goni F, Mehta PD, **Wisniewski T**. Toll-like receptor 9 stimulation for reduction of amyloid β and tau Alzheimer's disease related pathology. *Acta Neuropathologica Communications*, 2: 101, 2014.
159. Wegiel J, Flory M, Kuchna I, Nowicki K, Ma SY, Imaki H, Wegiel J, Frackowiak J, Kolecka BM, Wierzba-Bobrowicz T, London E, **Wisniewski T**, Brown WT. Neuronal nucleus and cytoplasm volume deficit in autistic children and volume increase in autistic adolescents and adults. *Acta Neuropathologica Communications*, under review.
160. Goñi F, Mathiason CK, Yim L, Wong K, Hayes-Klug J, Nalls A, Peyser D, Estevez V, Xu J, Osborn DA, Miller KV, Warren RJ, Brown DR, Chabalgoity JA, Hoover EA, **Wisniewski T**. Mucosal immunization with an attenuated Salmonella vaccine partially protects white-tailed deer from chronic wasting disease. *Vaccine*, in press.
161. Teohb CL, Sua D, Sahua S, Yunb SW, Prelli F, **Wisniewski T**, Chang YT. A Chemical Fluorescent Probe for the Detection of A β Oligomers. *Angew Chem*, under review.
162. Drummond ES, Nayak S, Ueberheide B, **Wisniewski T**. Proteomic analysis of individual

11/26/2014

Thomas Wisniewski MD

neurons isolated from formalin-fixed paraffin-embedded brain sections using laser microdissection. *Nature Methods*, under review

Books, Chapters in Books, Letters and Reviews:

1. Post K, Onesti S, **Wisniewski T.** Pituitary Apoplexy. In Intracranial Hemorrhages: Etiology, Pathogenesis, Clinical Features and Treatment. Editor Kauffman H.

11/26/2014

Thomas Wisniewski MD

Raven Press; 1991

2. **Wisniewski T.M.**, Wisniewski HM. Alzheimer's Disease and the Cerebral Amyloidoses. In Neurodevelopment, Aging and Cognition. Editors Ivica Kostovic, Stevo Knezevic, Henry M. Wisniewski and George J. Spilich, Birkhauser, Boston ; p157-172; 1992.
3. Frangione B, Haltia M, Levy E, Ghiso J, Kiuru S, Prelli F, **Wisniewski T.** Familial amyloidosis- Finnish type- and its relationship to Lewy bodies in Parkinson's and Diffuse Lewy Body disease. In the Proceedings of the XIth International Congress of Neuropathology- Kyoto; p150-156; 1992.
4. **Wisniewski T**, Haltia M, Ghiso J, Frangione B. I corpi di Lewy immunoreagiscono con gli anticorpi dell-amiloide di tip Finnico omologo alla gelsolina. *Update on Parkinson's disease and migraine* 1992; 2:59-60.
6. **Wisniewski T**, Frangione B. Aberrant aggregation of a normal amyloid precursor protein fragment. *Neuroscience Facts* 1992; 3:66.
7. Frangione B, **Wisniewski T**, Tagliavini F, Bugiani O, Ghiso J. Alzheimer's disease and Dutch variant: "Opposing faces of a single coin." In Alzheimer's Disease: Advances in Clinical and Basic Research. Editors: Corain B, Iqbal K, Nicolin M. Wiley; p:387-396;1993.
8. Frangione B, **Wisniewski T**, Ghiso J. Alzheimer's disease and amyloid β . In Amyloid and Amyloidosis 1993. Ed.:Kiselevsky R, Benson MD, Frangione B, Gauldie J, Muckle TJ, Young ID. Parthenon Publishing, 1994; pp:310-315.
9. Ghiso J, **Wisniewski T**, Frangione B. Unifying features of systemic and cerebral amyloidoses. *Molecular Neurobiology* 1994; 8: 49-64.
10. Frangione B, **Wisniewski T**, Ghiso J. Position Paper on Alzheimer's Disease Research. *Neurobiology of Aging* 1994; 15 (suppl 2):S97-S99.
11. Frangione B, **Wisniewski T**, Castano E, Ghiso J. Amyloids, Genes and Chaperones. In Research Advances in Alzheimer's Disease and Related Disorders. Ed. Iqbal K., Mortimer JA, Winblad B, Wisniewski T. Publisher John Wiley, Chapter 61, pp:563-568; 1995.
12. Zlokovic, B., Mackic, J., Martel, C., **Wisniewski, T.**, Frangione, B., and Ghiso, J.: The blood brain barrier regulates transport of Alzheimer's amyloid β and apolipoproteins E and J. In K. Iqbal, J. Mortimer, B. Winblad and H.

11/26/2014

Thomas Wisniewski MD

Wisniewski (eds.) Research advances in Alzheimer's disease and related disorders. Proceedings of the IV international conference on Alzheimer's disease and related disorders. Minneapolis, July/August, 1994. John Wiley & Sons, Chichester (England), 1995, pp 585-595.

13. **Wisniewski T**, Frangione B. The molecular biology of brain aging and neurodegenerative disorders. *Acta Neurobiologiae Experimentalis* 1996; 56: 267-279.
14. **Wisniewski T**, Frangione B. Apolipoprotein E, Amyloidosis and Alzheimer's Disease. *Dementia (Japan)* 1996; 10: 171-183.
15. Frangione B, Castano EM, **Wisniewski T**, Ghiso J, Prelli F, Vidal R. Apolipoprotein E and amyloidosis. *Ciba Foundation Symposium* 1996; 199: 132-141.
16. Frangione B, Castano EM, Prelli F, Soto C, Ghiso J, **Wisniewski T**. Chaperoning Amyloid in Alzheimer's Disease: The Art of Avoiding Sticky Situations? In: A.D.Roses, K.H. Weisgraber and Y.Christen (ed.) Apolipoprotein E and Alzheimer's Disease; Springer-Verlag, Berlin, Heidelberg, 1996; pp: 151-160.
17. **Wisniewski T**, Ghiso J, Frangione B. Alzheimer's Disease and Amyloid β . *Neurobiology of Disease* 1997; 4: 313-328.
18. **Wisniewski T**, Dowlat K, Frangione B. The Prionoses and Other Conformational Disorders. *Amyloid: The International Journal of Experimental and Clinical Investigation* 1998; 5: 212-224.
19. Wisniewski HM, Wegiel J, **Wisniewski T**. Pathogenesis of amyloid- β plaques: activated microglia the cause of fibrillar amyloid formation and neuropil degeneration. *NeuroScience News* 1998; 1: 30-34.
20. Lalowski M, Baumann M, Rauvala H, Frangione B, **Wisniewski T**. HB-GAM, a novel amyloid associated protein, is present in prion related disorders and other cerebral amyloidoses. In: Fischer et al. (Editors) Progress in Alzheimer's and Parkinson's Diseases; Plenum Press, New York, 1998; pp: 121-131.
21. Aucouturier, P, Frangione B, **Wisniewski T**. Prion Diseases and the Immune System. *Annals of Internal Medicine* (Paris, France), 1999; 150: 75-78.
22. **Wisniewski T**, Frangione B. Amyloid: Chemical and Molecular Considerations. In: M. DeLeon (Ed.) An Atlas of Alzheimer's Disease. Parthenon Publishing, Carnforth,

11/26/2014

Thomas Wisniewski MD

U.K., 1999; pp:109-130.

23. Aucouturier P, Carp RI, Carnaud C, **Wisniewski T**. Prion Disease and the Immune System. *Clinical Immunology*, 2000, 96: 79-85.
24. **Wisniewski T**, Frangione B. Book Review of *Prion Biology and Diseases*, Edited by Stanley B. Prusiner. *New England Journal of Medicine*, 2000, 342:983.
25. Kayden HJ, **Wisniewski T**. On the biological activity of Vitamin E. *American Journal of Clinical Nutrition*, 2000, 72: 201-202.
26. **Wisniewski T**. Henry M. Wisniewski, A life history. *Journal of Alzheimer's Disease*, 2001, 3: 7-22.
27. **Wisniewski T**, Sigurdsson EM, Aucouturier P, Frangione B. Chapter 13: Conformation as a Therapeutic Target in the Prionoses and other Neurodegenerative Conditions. In Baker HF (ed.) Molecular and Cellular Pathology in Prion Diseases. The Humana Press, Inc.(Totowa, NJ) p: 223-236, 2001.
28. **Wisniewski T**. Prion Related Diseases. In Lorenzo NY (ed.) eMedicine Neurology. <http://www.emedicine.com/neuro/topic662.htm>, 2002
29. Sigurdsson EM, Frangione B, **Wisniewski T**. A safer vaccine for Alzheimer's disease? *Neurobiology of Aging*, 23: 1001-1008, 2002.
30. **Wisniewski T**, Brown D, Sigurdsson EM. Therapeutics in Alzheimer's and Prion Diseases. *Biochemical Society Transactions*, 30: 574-578, 2002.
31. Sigurdsson EM, Frangione B, **Wisniewski T**. Immunization for Alzheimer's Disease. *Drug Development Research*, 56: 135-142, 2002.
32. Sigurdsson EM, **Wisniewski T**, Frangione B. Infectivity of Amyloid Diseases. *Trends in Molecular Medicine*, 8: 411-413, 2002.
33. **Wisniewski T**, Sigurdsson EM. Immunization Treatment Approaches in Alzheimer and Prion Diseases. *Current Neurology and Neuroscience Reports*, 2: 400-404, 2002.
34. Wegiel J, **Wisniewski T**, Reisberg B, Silverman W. Alzheimer dementia neuropathology. In: *Dementia. Presentations, differential diagnosis, and nosology*. Edited by V. Olga B. Emery, PhD. and Thomas E. Oxman, MD., The Johns Hopkins University Press, Baltimore and London, Chapter 4: 89-120, 2003.

11/26/2014

Thomas Wisniewski MD

35. Sadowski M, **Wisniewski T.** Immunological treatment and imaging approaches for prion disease. *Current Medical Chemistry: Immunology, Endocrine & Metabolic Agents*, 3: 113-118, 2003.
36. Sadowski M, Verma A, **Wisniewski T.** Prion Diseases. In *Neurology in Clinical Practice*, 4th Edition, Bradley W. (ed.), Chapter 59G: 1613-1630, 2004.
37. Sigurdsson EM, Wadghiri YZ, Sadowski M, Elliot JI, Li Y, Scholtzova H, Tang CY, Aguilnaldo G, Duff K, Turnbull DH, **Wisniewski T.** In vivo magnetic resonance of amyloid plaques in Alzheimer's disease model mice. Chapter in: *The Living Brain and Alzheimer's Disease*, Fondation IPSEN. Pages: 47-59, Ed. Hyman B., Springer Verlag Berlin Heidelberg, 2004.
38. **Wisniewski T**, Sadowski M. Book title: 100 Questions and Answers about Alzheimer's disease. Jones and Bartlett Publishers, 2004.
39. Sadowski M, **Wisniewski T.** Vaccines for Conformational Disorders. *Expert Review of Vaccines*, 3 (3): 279-290, 2004.
40. **Wisniewski T.** Mad cow disease and variant Creutzfeldt-Jakob disease. In Lorenzo NY (ed.) eMedicine Neurology. <http://www.emedicine.com/neuro> , 2004.
41. Ghiso J, **Wisniewski T.** An animal model of vascular amyloidosis. *Nature Neuroscience*, 7: 902-904, 2004.
42. Sasson J, Sadowski M, **Wisniewski T**, Brown DR. Therapeutics and prion disease: can immunization or drugs be effective? *Mini-Reviews in Medicinal Chemistry*, 5: 361-366, 2005.
43. Wadghiri YZ, Sigurdsson EM, **Wisniewski T**, Turnbull DH. MR Imaging of Amyloid Plaques in Transgenic Mice. Chapter 27, pages: 365-380; In Sigurdsson EM (ed) Amyloid Proteins: Methods in Molecular Biology Vol. 299, Humana Press Inc., Totowa, NJ, 2005.
44. **Wisniewski T**, Frangione B. Immunological and anti-chaperone therapeutic approaches for Alzheimer's disease. *Brain Pathology*, 15: 72-77, 2005.
45. **Wisniewski T.** Is amyloid-beta-peptide immunization clinically effective in patients with Alzheimer's disease? *Nature Clinical Practice Neurology*. 1: 84-85, 2005.
46. Sigurdsson E., **Wisniewski T.** Promising Developments in Prion Immunotherapy. *Expert Reviews of Vaccines*, 4: 607-610, 2005.

11/26/2014

Thomas Wisniewski MD

47. **Wisniewski T.**, Sigurdsson E. Prion Related Diseases. In Lorenzo NY (ed.) eMedicine Neurology. <http://www.emedicine.com/neuro/topic662.htm>, 2006
48. Sadowski M, **Wisniewski T.** Apolipoproteins in different amyloidoses. In *Protein Misfolding, Aggregation and Conformational Diseases*. Editors: Uversky VN, Fink AL; Kluwer Academic/Plenum Publishers. Chapter 16, pages: 329-350, 2006.
49. Sadowski M, **Wisniewski T.** Disease modifying approaches for Alzheimer's pathology. *Current Pharmaceutical Design* 13(19):1943-54, 2007.
50. **Wisniewski T**, Chabalgoity J.A. & Goni F. Is vaccination against transmissible spongiform encephalopathy feasible? In Animal vaccination – Part 1: development, production and use of vaccines (P.-P. Pastoret, M. Lombard & A.A. Schudel, eds). *Rev. sci. tech. Off. int. Epiz.*, 26 (1), 243-251, 2007.
51. Sigurdsson E., **Wisniewski T.** Therapeutic Approaches for Prion and Alzheimer's Diseases. *FEBS Journal*, 274: 3784-3798, 2007.
52. Sadowski M, Verma A, **Wisniewski T.** Infections of the Nervous System: Prion Diseases. In Neurology in Clinical Practice, 5th Edition, Bradley W. (ed.), Chapter 57G, 1567-1581, 2008.
53. **Wisniewski T**, Konietzko U. Amyloid- β immunisation for Alzheimer's disease. *Lancet Neurology*, 7(9):805-811, 2008.
54. **Wisniewski T**, Sadowski M. Preventing A β fibrillization and deposition: β -sheet breakers and pathological chaperone inhibitors. *BMC Neuroscience*, 9(Suppl 2):S5, 2008.
55. **Wisniewski T.** AD Vaccines: Conclusions and Future Directions, In *CNS & Neurological Disorders-Drug Targets*, 8(2): 160-166, 2009.
56. **Wisniewski T**, Boutajangout A. Vaccination as a Therapeutic Approach for Alzheimer' Disease. *Mount Sinai Journal of Medicine*, 77: 17-31, 2010.
57. **Wisniewski T**, Boutajangout A. Immunotherapeutic Approaches for Alzheimer's disease in transgenic mouse models. *Brain Structure and Function*, 214: 201-218, 2010.
58. Wegiel J, **Wisniewski T**, Chauhan A, Chauhan V, Kuchna I, Nowicki K, Imaki H, Wegiel J, Ma SY, Bobrowicz T, Cohen I, London E, Brown TW. Type,

11/26/2014

Thomas Wisniewski MD

topography, and sequelae of neuropathological changes: Shaping clinical phenotype of autism. In *Autism: Oxidative stress, inflammation, and immune abnormalities*. Boca Raton, FL, CRC Press, pages: 279-282, 2010.

59. **Wisniewski T**, Sigurdsson EM. Murine Models of Alzheimer's Disease and Their Use in Developing Immunotherapies. *BBA-Molecular Basis of Disease*, 1802: 847-859, 2010.
60. de Leon MJ, Rusinek H, Tsui W, **Wisniewski T**, Wegiel J, George A. Neuroimaging of cognitive disorders: commentary. Chapter 28 in *Understanding Neuropsychiatric Disorders*, Editors: Shenton ME, Turetsky BI. Cambridge University Press, pages: 395-401, 2010.
61. **Wisniewski T**, Goñi F. Immunomodulation for Prion and Prion Related Diseases. *Expert Review of Vaccines*, 9(12): 1441-1452, 2010.
62. Wadghiri YZ, Hoang DM, **Wisniewski T**, Sigurdsson EM. In vivo imaging of amyloid plaques in transgenic mice. *Methods in Molecular Biology*, 849: 435-451, 2012.
63. **Wisniewski, T**, Goñi, F. Immunomodulation. In: Zou, W. Q., Gambetti, P. (Eds) *Prions and Diseases*, 1st ed., Volume 2: Animals, Humans and the Environment. Publisher: Springer, New York, Chapter 17: 267-287, 2012.
64. Nelson PT, Alafuzoff I, Bigio EH, Bouras C, Braak H, Cairns NJ, Davies P, Del Tredic K, Duyckaerts C, Frosch MP, Hof PR, Hulette CM, Hyman BT, Iwatsubo T, Jellinger KA, Jicha GA, Kovari E, Kukull WA, Leverenz JB, Love S, Mackenzie IR, Mann DM, Masliah E, McKee AC, Montine TJ, Morris JC, Schneider JA, Sonnen JA, Thal DR, Trojanowski JQ, Troncoso JC, **Wisniewski T**, Woltjer RL, Beach TG. Correlation of Alzheimer's Disease Neuropathologic Changes and Cognitive Status: a Review of the Literature. *Journal of Neuropathology and Experimental Neurology*, 71(5):362-381, 2012.
65. **Wisniewski T**, Goñi, F. Could Immunomodulation be used to Treat Prion Diseases? *Expert Review of Anti-infective Therapy*, 10(3): 307-317, 2012.
66. Potter H, **Wisniewski T**. Apolipoprotein E: essential catalyst of the Alzheimer amyloid cascade. *International Journal of Alzheimer's Disease*, 2012:489428, 2012.
67. **Wisniewski T**. Active Immunotherapy for Alzheimer's disease. *Lancet Neurology*, 11(7):571-572, 2012.
68. Wegiel J, Schanen NC, Cook EH, Brown WT, Kuchna I, Nowicki K, Wegiel J, Imaki H,

11/26/2014

Thomas Wisniewski MD

- Ma SY, London E, **Wisniewski T.** Clinicopathological stratification of idiopathic autism associated with duplications 15q11.2-q13. In *The Neuroscience of Autism Spectrum Disorders*. Chapter 3.9, pages: 347-359, Edited by Joseph D. Buxbaum & Patrick R. Hof. Academic Press, Elsevier, Amsterdam, 2013
69. Boutajangout A., **Wisniewski T.** The Innate Immune System in Alzheimer's Disease. *International Journal of Cell Biology*, Volume 2013, Article ID 576383, 1-7. 2013.
70. Willhite CC, Karyakina NA, Yokel RA, Mornoli F, Yenugadhati N, **Wisniewski TM**, Ian MF, Krewski A, Krewski D. Systematic review of potential health risks posed by pharmaceutical, occupational and consumer exposures to metallic and nanodot aluminum, aluminum oxide and the soluble salts. *Critical Reviews in Toxicology*, 44 (S4):1-80, 2014.
71. Hartley D, Blumenthal T, Carrillo M, DiPaolo G, Esralew L, Gardiner K, Granholm AC, Iqbal K, Krams M, Lemere C, Lott I, Mobley W, Ness S, Nixon R, Potter H, Reeves R, Sabbagh M, Silverman W, Tycko B, Whitten M, **Wisniewski T.** Down Syndrome and Alzheimer's Disease: Common Pathways, Common Goals. *Alzheimer's & Dementia*, in press.
72. Wegiel J, Morys J, Kowianski P, Ma SY, Kuchna I, Nowicki K, Imaki H, Wegiel J, Flory M, Brown TW, **Wisniewski T.** Delayed development of the claustrum in autism. In *The Claustrum: Structural, Functional, and Clinical Neuroscience*. Edited by Smythies JR, Edelstein LR, Ramachandran VS. Academic Press, Chapter 8, pages: 225-235, 2014.
73. Rubenstein R, Peterson R, **Wisniewski T.** "Prion Diagnosis", In the Manual of Molecular and Clinical Laboratory Immunology (8th Edition) published by the American Society for Microbiology Press. (R.L. Hodinka, Ed.), in press.
74. **Wisniewski T**, Goni F. Immunotherapy for Alzheimer's disease. *Biochemical Pharmacology*, 88: 499-507, 2014.
75. Sabharwal P, **Wisniewski T.** Novel Immunological Approaches for the Treatment of Alzheimer's disease, *Chinese Journal of Contemporary Neurology and Neurosurgery*, 14: 139-151, 2014.
76. Boutajangout A, **Wisniewski T.** Tau as a therapeutic target in Alzheimer's disease. *Gerontology*, 60: 381-385, 2014.
77. Yaghmoor F, Noorsaeed A, Alsaggaf S, Aljohami W, Scholtzova H, Boutajangout A,

11/26/2014

Thomas Wisniewski MD

Wisniewski T. The Role of TREM2 in Alzheimer's Disease and other Neurological Disorders. *Journal of Alzheimer's Disease and Parkinsonism*, 4(5): 160, 2014.

78. Crary JF, Trojanowski JQ, Schneider JA, Abisambra JF, Alafuzoff I, Arnold SE, Attems J, Beach TG, Cairns NJ, Dickson DW, Gearing M, Grinberg L, Hof PR, Hyman BT, Jellinger K, Kovacs GG, Knopman DS, Kofler J, Masliah E, McKee A, Murray ME, Neltner JH, Santa-Maria I, Seeley WW, Serrano-Pozo A, Shelanski ML, Stein T, Takao M, Thal DR, Toledo JB, Troncoso JC, Vonsattel JP, White 3rd CL, **Wisniewski T**, Woltjer RL, Yamada M, and Nelson PT. Primary age-related tauopathy (PART): a common pathology associated with human aging. *Acta Neuropathologica*, 128(6): 755-766. 2014.
79. **Wisniewski T**, Goni F. Immunotherapeutic Approaches for Alzheimer's Disease. *Neuron*, in press.

Total of 241 full length peer reviewed publications (162 peer reviewed original data manuscripts and 79 peer reviewed book chapters, reviews or books).

Average Citations per manuscript: ~21

H-Index: 56 (using Web of Science); 62 (using Google Scholar)

Total Citations: >13,000

**UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA**

IN RE: NATIONAL FOOTBALL LEAGUE
PLAYERS' CONCUSSION INJURY
LITIGATION

No. 2:12-md-02323-AB
MDL No. 2323

Kevin Turner and Shawn Wooden,
*on behalf of themselves and
others similarly situated,*

Plaintiffs,

v.

National Football League and
NFL Properties, LLC,
successor-in-interest to
NFL Properties, Inc.,

Defendants.

THIS DOCUMENT RELATES TO:
ALL ACTIONS

DECLARATION OF Steven T. DeKosky, MD, FACP, FAAN, FANA

Steven T. DeKosky affirms under penalty of perjury the truth of the following facts:

1. I am Visiting Professor of Radiology and Neurology at the University of Pittsburgh School of Medicine, and Immediate Past Dean and Emeritus Professor of Neurology at the University of Virginia School of Medicine. My *curriculum vitae* is attached as Exhibit A.

2. I have been asked to submit this declaration in support of the objection to the proposed class action settlement in the above captioned case filed by the MoloLamken LLP law firm. I am not being compensated for my work in doing so.

3. Chronic traumatic encephalopathy (or CTE) is a unique neurodegenerative disease that is known to exist outside of ALS, Alzheimer's disease, or Parkinson's disease.

4. Repetitive brain trauma is a necessary condition for developing CTE.

5. ALS, Alzheimer's disease, and Parkinson's disease are found in the general population of individuals who have not suffered repetitive brain trauma. Suicidality does not present as a symptom of these diseases.

6. Mood and behavioral impairments such as depression, suicidality, hopelessness, impulsivity, explosiveness, rage, and aggression, although present in the general population, appear more frequently in individuals suffering from CTE than in the general population.

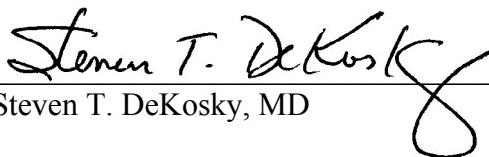
7. The mood and behavioral impairments associated with CTE can present prior to the onset of CTE-related dementia and can be the cause of significant disability and distress for the patient.

8. Based on my experience and knowledge of the clinical and scientific literature, I believe that a reliable, valid, and clinically accepted diagnosis of CTE, based, in part, on objective biomarkers, will likely be possible in the next decade, if not sooner, and long before the 65-year term of the proposed NFL Concussion Litigation Settlement expires.

9. I am not aware of the use of the diagnostic or classification categories of "Neurocognitive Impairment Level 1.0," "Neurocognitive Impairment Level 1.5," or "Neurocognitive Impairment Level 2.0" anywhere in the medical or scientific community.

Pursuant to 28 U.S.C. § 1746, I state under penalty of perjury that the foregoing is true and correct.

Dated: November 26, 2014



Steven T. DeKosky, MD

Exhibit A

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

CURRICULUM VITAE

STEVEN TRENT DeKOSKY, M.D.

CURRENT POSITION: Visiting Professor
 Department of Radiology (UPMC PET Center)
 University of Pittsburgh School of Medicine

Immediate Past Vice President/Dean and Emeritus Professor of Neurology
 University of Virginia School of Medicine

PERSONAL INFORMATION

Place of Birth: Camden, New Jersey, USA
 Residence: 3600 Raleigh Mountain Trail Current: 900 Miami Avenue
 Charlottesville, VA 22903 Pittsburgh, PA 15228
 Office: E-mail: DeKosky@Virginia.edu; DeKosky@mac.com

EDUCATION

1968	A.B. (Psychology)	Bucknell University Lewisburg, Pennsylvania
1968 -1970	Graduate Student	Depts. of Psychology and Neuroscience University of Florida Gainesville, Florida
1974	M.D.	University of Florida College of Medicine Gainesville, Florida

POSTGRADUATE TRAINING

1974-1975	Intern in Internal Medicine	The Johns Hopkins Hospital Baltimore, Maryland
1975-1978	Resident in Neurology	University of Florida College of Medicine Gainesville, Florida
1978-1979	Postdoctoral Fellow, Neurochemistry	Clinical Neuroscience Research Center/ department of Neurology University of Virginia School of Medicine Charlottesville, Virginia
1/14-1/26/01	Program for Chiefs of Clinical Services	Harvard School of Public Health Department of Health Policy and Management and the Center for Continuing Professional Education Boston, Massachusetts
10/01	Good Clinical Practices for Clinical Investigators	Association of Clinical Research Professionals Chicago, IL

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Nov. 2008	AAMC Executive Development Seminar for Deans Phase I	American Association of Medical Colleges Washington, DC
June 2009	AAMC Executive Development Seminar for Deans Phase II	American Association of Medical Colleges Washington, DC
September 2013- Visiting Scholar March 2014		Department of Medical Ethics and Health Policy University of Pennsylvania Perelman School of Medicine Philadelphia, PA
April 2014 - present	Visiting Scholar	Department of Radiology (UPMC PET Center) University of Pittsburgh School of Medicine Pittsburgh, PA

ACADEMIC POSITIONS

1978-1979	Instructor, Department of Neurology University of Virginia School of Medicine Charlottesville, Virginia
1979-1985	Assistant Professor of Neurology University of Kentucky College of Medicine
1980-1985	Assistant Professor of Anatomy University of Kentucky College of Medicine
1981-1990	Graduate Faculty University of Kentucky Graduate School
1983	Visiting Professor, Department of Psychobiology University of California - Irvine Laboratory of Dr. Carl W. Cotman
1985-1990	Associate Professor of Neurology (with tenure) University of Kentucky College of Medicine
1985-1990	Associate Professor of Anatomy and Neurobiology University of Kentucky College of Medicine Lexington, Kentucky
1985-1987	Interim Chairman, Department of Neurology University of Kentucky College of Medicine
1990-2008	Professor of Psychiatry (with tenure) Western Psychiatric Institute and Clinic (WPIC) & University of Pittsburgh School of Medicine Pittsburgh, Pennsylvania
1990-2008	Professor of Neurology and Neurobiology University of Pittsburgh School of Medicine
1991-2008	Graduate Faculty University of Pittsburgh School of Medicine

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

1993-2000	Chief, Division of Geriatrics and Neuropsychiatry, WPIC University of Pittsburgh School of Medicine
1997-2008	Professor of Human Genetics Graduate School of Public Health University of Pittsburgh
2000-2002	Interim Chair, Department of Neurology University of Pittsburgh School of Medicine
2001-2004	Director, Pittsburgh Institute for Neurodegenerative Diseases University of Pittsburgh and University of Pittsburgh Medical Center
2002-2008	Chair, Department of Neurology University of Pittsburgh School of Medicine
2008-2013	Dean, University of Virginia School of Medicine Vice President, University of Virginia James Carroll Flippin Professor of Medical Science
2008-2014	Professor of Neurology and Professor of Psychiatry and Behavioral Neurosciences University of Virginia School of Medicine
2008-present	Adjunct Professor of Neurology University of Pittsburgh School of Medicine
2013-2014	Visiting Professor Department of Medical Ethics and Health Policy University of Pennsylvania Perelman School of Medicine
2014-present	Visiting Professor Department of Radiology University of Pittsburgh School of Medicine
2014-present	Professor of Neurology Emeritus University of Virginia School of Medicine

HOSPITAL AFFILIATIONS

1979-1985	Attending Neurologist, University Hospital University of Kentucky, Lexington, Kentucky
1979-1990	Staff Neurologist VA Medical Center, Lexington, Kentucky
1982-1990	Associate Medical Staff (Neurology) Commission for Handicapped Children Commonwealth of Kentucky
1985-1987	Interim Neurologist-in-Chief, University Hospital Lexington, Kentucky
1985 -1990	Medical Staff, Cardinal Hill Rehabilitation Hospital Lexington, Kentucky

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

1990-2008	Medical Staff, University of Pittsburgh Medical Center Presbyterian-University Hospital, Western Psychiatric Institute and Clinic, Montefiore University Hospital Pittsburgh, Pennsylvania
2003-2008	Medical Staff, UPMC Health System, UPMC Shadyside Pittsburgh, Pennsylvania
2008-2013	Physician-in-Chief University of Virginia Health System Charlottesville, Virginia
2008-present	Medical Staff University of Virginia Health System Charlottesville, Virginia
2011-present	UVA Transitional Care Hospital and UVA Health South Rehabilitation Hospital Charlottesville, Virginia

PROFESSIONAL SOCIETIES AND ORGANIZATIONSAlzheimer's Association/Administration:

- National Board of Directors (1994-2002; 2004-2011) (reelected 2004 after required 1 year hiatus)
 Vice Chairman, 1998-2000
 Co-Chairman, Strategic Planning Committee, 1996-1997
 Member, Ethics Advisory Panel, 1997-present
 Development Committee, 2000- 2011
 Public Policy Committee, 2000-2011
 Finance Committee, 2006-2011

Alzheimer's Association/Research:

- National Medical and Scientific Advisory Board (MSAB)
 Member, 1994
 Vice-Chairman, 1995-1997
 Chairman, 1997-2000
 National Medical and Scientific Advisory Council (successor to MSAB)
 Chairman, 1997-2002
 Member, ad hoc, 2008-2014
 Member, Board of Directors, World Alzheimer Congress, 1998-2000
 Chair, Research Round Table – 2009
 Chair, Annual Public Policy Forum, Washington, DC, 2008
 Founding Chair, ISTAART (International Society to Advance Alzheimer Research and Treatment), 2008-2011;
 elected to second term 2012-2014

American Board of Psychiatry and Neurology

- Member, Neurology Council (2003-2010) (President, 2010)
 Member, Committee on Credentials –Neurology (2002-2005; Chair 2006-2010)
 Member, Committee on Finance (2002-2007)
 Member, Committee to Review Appeals – Neurology (2002-2007)
 Member, Committee on Research and Development – Neurology (2002-2010)
 Chair, Examination Committee – Neurology, Part B [behavioral neurology, neuropsychiatry, neuropsychology] (2008-present)
 Vice-Chair, Part I (Written Exam) Committee (2003-2004; Chair 2005-2007)

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Member, Informatics Committee (2002-2005)
 Member, Committee on Recertification (2002-2007)
 Member, Committee on Core Competencies (2002-2010)
 Member, Committee on Maintenance of Certification (2002-2010)
 Member, Task Force on Conflict of Interest (2002-2007)
 Chair, Strategic Planning Committee (2005-2010)
 Member, Nominating Committee for Year 2007 Officers (2005-2006)
 Liaison to Committee of Neurological Sciences (2005-2010)
 Chair, Combined Part I Committee (2008-2010)
 Chair, Vascular Neurology Steering Committee (2008-2010)
 Member, Committee on Research and Development – Neurology (2005-2010)
 ABPN Executive Committee 2008-2010
 Member at Large, 2008; Secretary, 2009; Vice President, 2010
 Member, Building Committee, 2013-present

Alzheimer's Disease International (ADI)

Executive Committee, 2002-2005
 Chair, Medical and Scientific Advisory Panel, 2002-2005
 Member, MSAP, 2006-present
 Member, International Advisory Board for 29th ADI Conference Dec 2013 (San Juan, Puerto Rico)

American Neurological Association (elected 1988)

Member, Long Range Planning Committee (1995-1997)
 Chair, Membership Committee (2006-2008)
 Member, Executive Council (elected) (2008-2011)
 Elected Fellow, 2013

American Academy of Neurology (Member since 1976; Fellow, 1983-present)

Section on Geriatrics (Founding Member)
 Chair (1996-1998); Vice Chair (1994-1996)
 Chairman, Liaison Committee (1991-1993)
 Chairman, Public Policy Committee (1993-1994)
 Section on Behavioral Neurology (Founding Member)
 Director, Annual Course in Geriatric Neurology (1992-1995)
 Chair, Aging and Dementia Program (1995-1996)
 Member, Scientific Issues Subcommittee (1995-1996)
 Member, Scientific Program Subcommittee (1995-1996)
 Member, Legislative Affairs Committee (1998-2008)
 Director, Dementia Update Course (1999-2002)
 Chair, Dementia Practice Parameters Committee of Quality Standards Subcommittee (1999-2001)
 Responsible for developing practice guidelines for early detection, diagnosis, and treatment of dementia

American College of Neuropsychopharmacology (ACNP; elected 2003)

Program Committee (2005-2007)
 Public Policy Committee (2005-2008)
 Human Research Committee (2006-2009)

American Society for Neurological Investigation (ASNI)
 Councilor for the Southern United States, 1986-1988

American Society for Experimental NeuroTherapeutics
 Board of Directors, 2005-2008, 2012-2015
 Society for Experimental Neuropathology
 Councilor (elected) 1990-1992; Assistant Secretary Treasurer 1993-1995
 Society for Neuroscience

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

International Society for Neurochemistry
 American Society for Neurochemistry
 Behavioral Neurology Society
 International Society of Neuropathology
 Fellow, Stroke Council, American Heart Association
 New York Academy of Sciences
 National Neurotrauma Society

HONORS AND AWARDS

1967	Psi Chi, Bucknell University (National Psychology honorary)
1968-1969	Predoctoral Fellowship, Center for Neurobiological Sciences University of Florida College of Medicine
1969	Phi Sigma, University of Florida
1972	Alpha Omega Alpha Research Award University of Florida College of Medicine
1974	Roger Schnell Award for Excellence in Clinical Neurology (Graduation Award, University of Florida College of Medicine)
1978-1979	National Research Service Award in Developmental Neurology (Neurochemistry) NINCDS
1980-1985	Teacher-Investigator Development Award, NINCDS
1983	Sigma Xi, University of Kentucky
1987	Research Associate, Sanders-Brown Research Center on Aging
1988	William Osler Fellow, University of Kentucky College of Medicine
1988	Presidential Award, American Neurological Association
1992	<i>Who's Who in the East</i>
1994-present	<i>The Best Doctors in America</i>
1994-1995	<i>Who's Who Worldwide</i>
1996-1997	<i>Best Doctors in America: Northeast Region</i>
1996	Univ. of Pittsburgh Nominee: 1997 King Faisal International Prize for Medicine
1996	<i>Who's Who in Medicine and Healthcare</i>
1997	<i>Who's Who in Science and Engineering</i>
1997	11 th Annual Joseph M. Foley, M.D. Lecturer, Cleveland Clinic Foundation
1998	<i>Who's Who in America</i>
1998	David B. Tyler Memorial Lecturer, University of South Florida College of Medicine
1999	Distinguished Alumnus of the University of Florida College of Medicine
2000	Ralph W. Richter Award for Excellence in the Field of Alzheimer's Research
2001	George Randolph and Patricia Scott Lectureship on the Physiology of Aging, Mayo Foundation, Rochester, MN
2003-present	Member (Neurology) American Board of Psychiatry and Neurology
2002	<i>Who's Who in Health Sciences Education</i>
2003	Rita Hayworth Award for Alzheimer's Disease Research, national Alzheimer's Association
2003-present	<i>Best Doctors in America</i> (continuously elected to present)
2003-present	<i>Who's Who in America</i> (continuously elected to present)
2004-present	<i>America's Top Doctors</i> (continuously elected to present)
2005	Ronald and Nancy Reagan Research Institute Award for outstanding contributions to research, care, and advocacy on behalf of Alzheimer's patients and their caregivers. NIH Great Teachers Lecturer "Alzheimer's Disease"
2006	Alzheimer's Association Zaven Khachaturian Award
2008	James Carroll Flippin Chair in Medical Sciences, University of Virginia
2008-2013	<i>Who's Who in Medicine and Healthcare</i> (continuously elected)
2009-present	Fellow, American Neurological Association
2013	Invited Commencement Speaker, University of Florida College of Medicine
2013	Luttge Invited Neuroscience Lecturer, University of Florida
2014	

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.BOARD CERTIFICATION AND LICENSURE

- 1975 Diplomate of the National Board of Medical Examiners
 1978 Certificate of Registration in Medicine and Surgery of the State of Virginia [active]
 1979 Medical Licensure, State of Kentucky
 1979 Diplomate of the American Board of Psychiatry and Neurology (Neurology)
 1990 Certificate of Registration in Medicine and Surgery of the State of Pennsylvania [active]
 2004-2014 Recertification in Neurology, American Board of Psychiatry and Neurology
 (still hold lifetime certification)

RESEARCH INTERESTS

Dementia, especially Alzheimer's disease: diagnosis, treatment, prevention; neurochemistry, genetics, neuroimaging, epidemiology, neuropsychiatry
 Central Nervous System regeneration and response to injury
 Traumatic Brain Injury and relationship to long-term neurological outcomes
 Ethics, health policy, and clinical/biomarker aspects of preclinical assessment for dementia

PATENTS

1997: "Use of the genetics of alpha-1-antichymotrypsin (ACT) and levels of ACT in blood and CSF for diagnosis of Alzheimer's disease" (With M. Ilyas Kamboh, Ph.D.)

JOURNAL AND GRANT REVIEWEditorial Boards

Archives of Neurology (1997-present)
 Associate Editor, 2002-2005
Alzheimer Disease and Associated Disorders: An International Journal (1993-present)
Brain Aging International Journal (2002-present)
Neurotherapeutics (2010-present)
Alzheimer's and Dementia: Translational Research and Clinical Interventions (2014-present)
 Senior Associate Editor
Annals of Neurology (2001-2014)
Journal of Alzheimer's Disease (2002-2010)
Neurodegenerative Diseases (2002-2009)
Current Alzheimer Research (2003-2010)
Neurosurgery (2005-2014)

Journal Reviewer:

American Journal of Psychiatry
Annals of Neurology
Archives of General Psychiatry
Archives of Neurology
Experimental Neurology
Journal of the American Medical Association (JAMA)

NIH Consulting, Study Sections, and Council:

National Institute of Health Common Fund
 Scientific Advisory "Council of Councils" 2013-2016

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Member, Working Group on evaluating and making recommendations for changes to Common Fund Operations, Programs, Management and Oversight (2013-14)

National Center for Complementary and Alternative Medicine (NCCAM)
 Scientific Advisory Council, 2009-2013
 Chair, Drug Safety Monitoring Board, Creatine Safety, Tolerability, & Efficacy in Huntington's Disease (CREST-E) Study, NCCAM (active)
 Chair, NCCAM Botanical Research Expert Panel, 2013

Study Sections Member:

NIA-Neuroscience Review Committee (1997-2001); Chairperson (2000-2001)
 National Institute on Aging: Ad Hoc Study Sections on Alzheimer's Disease Research Centers:
 Member and Chair multiple times between 1995 and 2012; ADRC Study Section Chair, October 2013.

Alzheimer's Disease Research Centers (NIA funded) elected positions:

Chair, ADRC Center Directors Executive Committee
 Chair, National Alzheimer Coordinating Center Steering Committee

National Institute on Aging Study Section: Geriatric Research and Training Centers (GRTCs)
 Research Career Development Award Study Section, Medical Research Service, VA Central Office
 Small Grants Review Committee, National Institute of Aging (multiple)
 Small Business Innovation Research (SBIR), NIAA
 National Institute on Aging Search Committee for Director of Neuroscience, NIA 2010-2011

Ad Hoc Grant Reviewer:

Chair, Brain Canada.Chagnon Family Foundation, ADRD Prevention Initiative Review Group, 2013
 Peer Review Committee, Canadian Consortium on Neurodegeneration in Aging (CCNA); 2013-14
 Alzheimer Association
 National Science Foundation
 Veterans Administration Merit Review Board in Neurobiology
 Veterans Administration Research Advisory Group (RAG) Committee
 Recombinant DNA Advisory Committee (RAC), NIH
 Commonwealth of Virginia: Alzheimer's Disease and Related Disorders Research Fund
 Ohio State Board of Regents: Ohio Eminent Scholars Program
 Human Frontier Science Program (Strasbourg, France)
 Alzheimer Disease International, multiple ad hoc; most recently 2013

COMMITTEES AND ADMINISTRATIVE DUTIES

University of Kentucky (1979-1990)

Utilization Review Committee, University of Kentucky Medical Center; 1979-83
 Pharmacy and Therapeutics Committee, VA Medical Center, Lexington, KY; 1979-82
 Committee on Aging, University of Kentucky Medical Center; 1980-82
 Animal Care Subcommittee, University of Kentucky Medical Center; 1980-83
 Research Budget Committee, Lexington VA Medical Center 1982-85
 (Chairman, 1982-84); 1987-1990
 Research and Development Committee, Lexington VA Medical Center
 1980-83, 1984-85 (Chairman, 1982-83)
 Student Progress and Promotions Committee, University of Kentucky College of
 Medicine; 1984-85 (Faculty Council Liaison)
 Faculty Council (elected), University of Kentucky College of Medicine; 1984-85
 Geriatric Advisory Board, Lexington VA Medical Center; 1984-1990
 Quality Assurance Committee, Department of Neurology, University of Kentucky
 1985-1990 (Chairman, 1985-87)
 Department of Neurology Review/Chairman Search Committee (Department
 Representative) 1985-87

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Steering Committee, Magnetic Resonance Imaging and Spectroscopy Center,
 University of Kentucky, 1985-1987
 Veterans Administration Dean's Committee, Lexington VA Medical Center; 1985-1987
 University Hospital Clinical Board, University of Kentucky Medical Center; 1985-1987
 Chiefs of Clinical Service Committee, Univ. of Kentucky College of Medicine; 1985-1987
 Chairman's Council, University of Kentucky College of Medicine; 1985-1987
 Quality Assurance Review Board, Lexington VA Medical Center, 1987-1988
 Research Committee, University of Kentucky College of Medicine, 1988-1991
 Research Budget Committee, Lexington VA Medical Center, 1988-1990
 Faculty Council (elected), University of Kentucky College of Medicine, 1989-1991

University of Pittsburgh (1990-2008)

Alzheimer's Disease Research Center Internal Advisory Group
 University of Pittsburgh Medical Center, 1990-present
 Director, Behavioral Neurology/Neuropsychiatry of Aging Training Program
 University of Pittsburgh, 1990-2008
 Task Force on Geriatric Programs, University of Pittsburgh Medical Center, 1991-2008
 Residency Selection Committee, Department of Psychiatry, WPIC, 1990-2000
 Department of Neurology Chairman Search Committee, 1992-1993
 Director, Division of Geriatrics & Neuropsychiatry, Department of Psychiatry, 1992-2001
 Director, Geriatric Health Services, University of Pittsburgh Medical Center, 1992-2002
 Executive Committee, Center for Neurosciences/University of Pittsburgh, 1992-2008
 Academic Promotions Committee, Department of Psychiatry, 1993-2001
 Adult Medical Directors Committee, Western Psychiatric Institute and Clinic, 1993-1999
 WPIC Research Strategic Planning Committee, 1993-2008
 Functional Imaging Research Program Scientific Advisory Committee, 1994-2001
 Associate Scientist, Safar Center for Resuscitation Research, 1995-2008
 Executive Committee, Western Psychiatric Institute and Clinic, 1997-2008
 University Council on Aging, 2000-2008
 Clinical Research Steering Committee, 2000-2008
 University of Pittsburgh Physicians, Council of Clinical Chairs, 2000-2008
 University of Pittsburgh Physicians, Board of Directors, 2000-2008
 Executive Committee, UPMC Medical Staff, 2000-2008
 Executive Board, Pittsburgh Development Center, 2001-2008
 Chair, Department of Neurosurgery Search Committee, University of Pittsburgh, 2006-2007
 Internal Advisory Board, University of Pittsburgh Sleep Medicine Institute, 2008

University of Virginia (2008-2013)

President's Cabinet
 Medical Center Operating Board (MCOB) Member (ex officio as VP/Dean)
 MCOB Quality Subcommittee Co-Chair
 Physician in Chief, University of Virginia Health System
 University Physician's Group (UPG) (Medical Faculty Practice Plan)
 Board of Directors
 Executive Committee
 Finance Committee
 Nominating Committee
 Ivy Foundation Board of Directors
 UVA Health Foundation Board of Directors
 Culpeper Regional Hospital Board of Trustees
 Health System Clinical Strategy Group Co-Chair
 Strategic Planning Executive Committee

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Clinical Staff Executive Committee
 Medical Alumni Association Board of Directors
 Medical School Foundation Board of Trustees
 Virginia Urologic Foundation (VUF) Board of Directors
 Director, UVA Alzheimer's Disease Research Center

CLINICAL AND RESEARCH RELATED ACTIVITIESUniversity of Kentucky 1979-90:

Gordon Conference on Biology of Aging (Invited Participant), Ventura, California, 1982
 Board of Directors, Lexington Bluegrass Alzheimer's Disease and Related Disorders
 Association (ADRDA), 1984-1990 (Founding Member)
 Invited Examiner, Part II (oral examinations), American Board of Psychiatry and
 Neurology, 1981-present
 Medical Review Board, Division of Driver Licensing, Commonwealth of Kentucky, 1985-1990
 Professional Education Committee, Kentucky Organ Donors Association, 1987-1990
 Director, Memory Disorders Clinic, University of Kentucky Medical Center 1984-1990
 Co-Director, Alzheimer's Disease Research Center, University of Kentucky, 1985-1990
 Governor's Task Force on Alzheimer's Disease, State of Ohio (Vice Chair) 1986-1992

University of Pittsburgh 1990-2008

Co-Director, Alzheimer's Disease Research Center, 1990-1994
 Director, Memory Disorders Clinic, 1990-2008
 Invited Participant, FASEB Meeting on Neurobiology of Brain Injury Copper Mountain, CO, June 1992
 Chairman, Professional Advisory Board, Greater Pittsburgh Chapter Alzheimer's Association, 1992-present
 Member, External Advisory Committee, University of Rochester Alzheimer's Disease Center, 1993-1998
 Director, Alzheimer's Disease Research Center University of Pittsburgh, 1994-2008
 Chairman, External Advisory Committee, University of Indiana Alzheimer's Disease Center, 1995-present
 Chairman, External Advisory Committee, Emory University Alzheimer's Disease Center, 1995-2000
 Member, External Advisory Committee, Alzheimer's Disease Research Center, University of Alabama at
 Birmingham, 1999-2004
 Member, External Advisory Board, Alzheimer's Disease Research Center
 University of Texas Medical School-Dallas, 1991-1998
 Member, Executive Committee, National Alzheimer's Coordinating Center [elected], 1999-present
 Chairman, 2001-2003
 Member, County of Allegheny, Division of Forensic Neuropathology Advisory Board, 2002-present
 Director and Committee Organizer, Barcelona-Pittsburgh Conference "Dementia Today," 2000, 2002, 2004,
 2006
 Member, Academic Advisory Board, Pfizer Biology Psychiatry Postdoctoral Fellowship Program, 1999-2004
 (Chair, 2003-2004)
 Chairman, External Advisory Committee, University of California-Davis Alzheimer's
 Disease Center, 2005-present
 Chairman, External Advisory Committee, Harvard / Massachusetts General Hospital Alzheimer's
 Disease Center, 2006-2011
 Member, Board of Directors, American Society for Experimental NeuroTherapeutics, 2005-present
 Member, Alzheimer's Disease Cooperative Study Internal Ethics Committee, 2007-present
 Member, External Advisory Board, Hellman Center, University of California San Francisco, 2009-2011
 Member, External Advisory Board, Sanders-Brown Center on Aging, University of Kentucky, 2010-2011

INVITED LECTURES: 2005-present

American Medical Directors Association Annual Symposium. San Francisco, CA, March 2000.
 Medical College of Georgia, Dean's Symposium. Augusta, GA, March 2000.
 University of Arkansas, Dementia Center of Arkansas. Benton, AR, August 2000.
 Barcelona-Pittsburgh Dementia Today Conference. Barcelona, Spain, October 2000

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Mini-Medical School. Harrisburg, PA, January 2001.
 American Society of Neuroradiology Symposium. Boston, MA, April 2001
 Northwestern University Medical School, Chicago, IL, April 2001.
 Dean's Lecture Series, University of Kentucky College of Medicine, Lexington, KY, May 2001.
 Eleventh Annual Matthew and Marcia Simons Lecturer, Boston, MA, November 2001.
 George Randolph and Patricia Scott Lectureship on the Physiology of Aging, Rochester, MN, Nov. 2001.
 Southern Clinical Neurological Society 29th Annual Meeting, Puerto Vallarta, Mexico, January, 2002.
 American Association for Geriatric Psychiatry 15th Annual Meeting, Orlando, FL, February, 2002.
 American Society of Neuroimaging 25th Annual Meeting, Tampa Bay, FL, March, 2002.
 John A. Burns School of Medicine, University of Hawaii, Honolulu, HI, Kaiser Lecture, March, 2002.
 American Society for Pharmacology and Experimental Therapeutics-Ray Fuller Symposium, New Orleans, LA, April, 2002.
 7th Neurodegenerative Disorders: Common Molecular Mechanisms, Montego Bay, Jamaica, April, 2002.
 Geriatric Medicine Grand Rounds, University of Rochester, Rochester, MN, September, 2002.
 Barcelona-Pittsburgh Dementia Today Conference. Barcelona, Spain, October 2002.
 2nd Conference of the Korean Dementia Society. Seoul, Korea, November, 2002.
 Neurology Grand Rounds, University of Maryland. Baltimore, MD, February, 2003.
 American Society for Experimental NeuroTherapeutics 5th Annual Meeting. Washington, DC, March, 2003.
 Parkinson Study Group 16th Annual Meeting, Key Biscayne, FL, May, 2003.
 43rd Annual NCDEU Meeting, Boca Raton, FL, May, 2003.
 11th Annual International Psychogeriatric Association Meeting, Chicago, IL, August, 2003.
 2nd Annual Dementia Congress, Washington, DC, September, 2003.
 3rd Annual International College of Geriatric Psychoneuropharmacology, San Juan, Puerto Rico, December, 2003.
 Update on Early Treatment and Diagnosis of Alzheimer's Disease, Pittsburgh, PA, March, 2004.
 6th Annual Meeting of the American Society for Experimental NeuroTherapeutics , Bethesda, MD, March, 2004.
 8th International Montreal/Springfield Symposium on Advances in Alzheimer Therapy, Montreal, Canada, April, 2004.
 American Society for Pharmacology and Experimental Therapeutics, Washington, DC, April, 2004.
 1st Esteve International Symposium on Alzheimer's Disease, Barcelona, Spain, May, 2004.
 International Symposium on Neurological Disorders, Shanghai, China, August, 2004.
 Institute of Medicine 2004 Annual Meeting, Washington, DC, October, 2004.
 Barcelona-Pittsburgh Conference, Dementia Today, Barcelona, Spain, October, 2004.
 Northwestern Drug Discovery Program Keynote Lecture, Chicago, IL, November, 2004.
 Macy Conference, The Convergence of Neuroscience, Behavioral Science, Neurology and Psychiatry, Scottsdale, AZ, January, 2005.
 7th Annual Meeting of the American Society for Experimental NeuroTherapeutics, Washington, DC, March, 2005.
 Annual Mild Cognitive Impairment Symposium, Miami Beach, FL, March, 2005.
 University of Michigan Grand Rounds, Ann Arbor, MI, April, 2005.
 University of Arkansas for Medical Sciences Conference on Complementary and Alternative Therapies, Little Rock, AR, April, 2005.
 Neurology Grand Rounds, Robert Wood Johnson Medical School, New Brunswick, NJ, May, 2005.
 Smithsonian Mini-Med School: Aging Under the Microscope, Washington, DC, May, 2005.
 Society of Biological Psychiatry Annual Meeting, Atlanta, GA, May, 2005.
 International Conference on Prevention of Dementia, Washington, DC, June, 2005.
 21st International Conference of Alzheimer's Disease International, Istanbul, Turkey, September 2005.
 10th Annual Graylyn Conference on Women's Cognitive Health: Fostering a Dialogue that Leads to Cutting Edge Translational Research, Winston-Salem, NC, October, 2005.
 CNS Disease Congress: Novel Advances in Discovery, Therapeutics & Clinical Trials, Boston, MA, March, 2006.
 Contemporary Clinical Medicine: Great Teacher's Lecture, National Institute of Health Clinical Center Grant Rounds, Bethesda, MD, April, 2006.
 9th International Geneva/Springfield Symposium on Advances in Alzheimer Therapy, Geneva, Switzerland, April, 2006.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Southern Illinois Center for Alzheimer Disease and Related Disorders, Visiting Professorship, Springfield, IL, April, 2006.

8th Annual Future Leaders in Psychiatry Meeting, Miami Beach, FL, May, 2006.

Massachusetts General Hospital Grand Rounds, Boston, MA, June, 2006.

10th International Conference on Alzheimer's Disease and Related Disorders, Madrid, Spain, July, 2006.

Barcelona-Pittsburgh Conference, Dementia Today, Barcelona, Spain, October, 2006.

5th Annual Dementia Congress, Washington, DC, November, 2006.

Merck Research Laboratories Guest Lecturer, West Point, PA, November, 2006.

The Southern Clinical Neurological Society, Aruba, Dutch Caribbean, January, 2007.

American Association for Geriatric Psychiatry, New Orleans, LA, March, 2007.

University of Cincinnati Grand Rounds, March, 2007.

Albert Einstein Grand Rounds, New York, NY, May, 2007.

International Conference on Prevention of Dementia, Washington, DC, June, 2007.

Ohio State Lecture, Columbus, OH, June, 2007.

Erice International Seminars on Planetary Emergencies, Sicily, Italy, August, 2007.

University of Florida, Department of Psychiatry Grand Rounds, September, 2007.

University of Alabama Birmingham, Lindy E. Harrell Lecture in Alzheimer's Disease, September, 2007.

University of North Texas Health Sciences Center at Fort Worth Distinguished Speaker Series, October, 2007.

Korean Neurologic Association, Seoul, Korea, October, 2007.

Neurology Grand Rounds, Penn State Milton S. Hershey Medical Center, Hershey, PA, November, 2007.

Grand Rounds, Mount Sinai Hospital, Department of Neurology, New York, NY, November, 2007.

Brain and Behavior: Advances in Neuroimaging, 12th Robert G. Heath, MD Lecture, Tulane University School of Medicine, New Orleans, LA, December, 2007.

10th Annual Meeting of the American Society for Experimental NeuroTherapeutics, Inc., Arlington, VA, March, 2008.

VI Barcelona Pittsburgh Conference, Barcelona, Spain, May, 2008.

Cleveland Clinic Visiting Professor, Cleveland, OH, October 12-13, 2008.

National Institute of Neurological Disorders and Stroke, Dementia of Alzheimer's Disease and Epilepsy, Rockville, MD, October 15-17, 2008.

University of California, Irvine Institute for Brain Aging and Dementia, Irvine, CA, October 23-24, 2008.

Johns-Wooten Symposium, Charlottesville, VA, "Treatment of Alzheimer's Disease" Address - Wooten Neurological Symposium, November 8, 2008.

University of Michigan, MADRC Community Appreciation Conference, Ann Arbor, MI, November 13-14, 2008.

Alzheimer's Association, New Directions in Dementia, Rancho Mirage, CA, November 20-22, 2008.

Johns-Wooten Symposium, Charlottesville, VA "Treatment of Alzheimer's Disease" Address - Wooten Neurological Symposium, November 8, 2008.

Los Angeles Alzheimer's Association/UCLA ADRC "Update on Alzheimer's Disease," Palm Springs, CA, November 21, 2008.

The Role of Neuroimaging in Clinical Trials and Drug Discovery, ASENT Annual Meeting, Washington, DC, March 7, 2009.

Meeting Chair, Prevalence & Trends of AD & Other Age-Related Cognitive Impairment in US, NIA Meeting, Washington, DC, March 20, 2009.

The Ginkgo Evaluation of Memory (GEM) Study Miami MCI Annual Meeting, Miami Beach, FL, March 28, 2009.

"What's on Your T-shirt? Empowering Individual and Team Success in Clinical and Translational Research," Association for Clinical Research Training and the CTSA Education Consortium, Washington, DC, [Keynote speaker] April 14, 2009.

"Frontiers in Medicine: Interventions for Alzheimer's Disease," Grand Rounds, Texas A&M University School of Medicine, College Station, TX, April 23, 2009.

"Neurochemistry and Neuropathology of MCI," in AAN Course: MCI: Implications for Clinicians, Seattle, WA, April 27, 2009.

"Biomarkers of Alzheimer's Disease," UCSF/Northern California Alzheimer's Association, San Francisco, CA, June 3, 2009.

"Advances in Imaging and Improvements to Treatment Outcomes," University of Virginia/Alzheimer's Association Annual Education Meeting, Charlottesville, VA, June 20, 2009.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- "What Does the Brain Have to Do with Behavior? A Personal Journey," Summer Medical and Dental Education Program, University of Virginia School of Medicine, Charlottesville, VA, July 7, 2009.
- "Biomarkers and Lab Correlates," NINDS Clinical Trials Methods Course, Vail, CO, August 17, 2009
- "Frontiers in Alzheimer's Disease Clinical Trials" NINDS Clinical Trials Methods Course, Vail, CO, August 17, 2009.
- "Can Dementia be Prevented?" International Psychogeriatrics Association (IPA), Montreal, Canada, September 2, 2009.
- "Debate: New Research Criteria for Dementia Should Be Adopted," Canadian Conference on Dementia, Toronto, Canada, October 2, 2009.
- "Amyloid Imaging with Positron Emission Tomography," Canadian Conference on Dementia, Toronto, Canada, October 2, 2009.
- "The GEM Study: Lessons Learned" Alzheimer's Association Research Roundtable, Washington, DC, October 19, 2010
- Miami Early Dementia Conference, Miami, FL, March 12, 2010.
- "Alzheimer's Disease: Progress, Translational Research, and the Future." Mayo Clinic Neurology Grand Rounds, Rochester, MN, March 19, 2010.
- "Current and Future Strategies in Alzheimer's Disease," Florida Hospital Distinguished Lectureship, Orlando, FL, April 21, 2010.
- "Twenty Years of Alzheimer's Research: Past, Present & Future" Alzheimer's Association, Denver, CO, May 3, 2010
- "The Role of Amyloid and Tau Protein in AD." 7th Barcelona/Pittsburgh Biennial Conference – Dementia Today, May 12-14, 2010.
- "Extending the Meaning of Alzheimer's Disease: New Diagnostic Criteria, New Biomarkers, New Understanding," University of California San Francisco, August 25, 2010.
- "Successful Leadership," NINDS/ANA Career Development, San Francisco, CA, September 11, 2010.
- "Translational Research Advances in Alzheimer's Disease" Neuroscience Seminar, University of "Louisville Seminar Series, September 22, 2010.
- "Progress in Alzheimer's Disease: New diagnostic criteria, new biomarkers, new challenges" Grand Rounds, Department of Psychiatry, Dartmouth School of Medicine, Lebanon, New Hampshire, Sept. 27, 2010.
- "Alzheimer's Disease 2010: What Have We Learned? Where Are We Going?" Central and Western Virginia Alzheimer's Association, Roanoke, VA, November 4, 2010.
- "Progress in Alzheimer's Disease: New Diagnostic Criteria, New Biomarkers, New Challenges" Robert G. Heath Invited Lecture, Tulane University School of Medicine, New Orleans, LA, December 3, 2010.
- "Ethics in Alzheimer's Disease: New diagnostic criteria, new biomarkers, new challenges". National Press Foundation, Washington, DC December 7, 2010.
- "Long Term Consequences of Traumatic Brain Injury." Grand Rounds, Fort Detrick Army Garrison, Frederick, MD, January 20, 2011.
- "Alzheimer's Disease: From Bench to Bedside and Hopes from Translational Discoveries." University of South Florida, Grozman Family Lecture, Tampa, FL, March 25, 2011.
- "Neuroimaging in Alzheimer's Disease: From 'Rule Outs' to Preclinical Diagnosis. Virginia Neurological Society, February 2, 2013.
- "Technological Advances and Progress in Dementia Research." Fritz Dreifuss Memorial Lecture, Virginia Neurological Society, February 2, 2013.
- Commencement Address, University of Florida College of Medicine, Gainesville, FL May 12, 2013
- "Alzheimer's Disease: the State of the State" Alzheimer's Disease International Conference. Boston, MA, July 13, 2013
- "Amyloid Imaging in Clinical Practice" (Opening Plenary Lecture) Alzheimer's Disease International Conference., Boston, MA, July 14, 2013
- "The Ginkgo Evaluation of Memory Study: A Model for AD Prevention Trials." University of Minnesota and Minneapolis VA Medical Center September 23, 2013
- "Alzheimer's Disease: Past, Present and Future" Vanderbilt University Department of Neurology Grand Rounds, September 26, 2013
- "Alzheimer's Disease: A Geriatrics Perspective" Meharry School of Medicine Meharry Consortium Geriatric Education Center Geriatric Update, September 27, 2013
- "The History and Future of Alzheimer's Disease." Alzheimer's Association, Nashville, TN, September 27, 2013

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- "Early and preclinical diagnosis of Alzheimer's Disease: Practical and Biomarker Considerations." American Neurological Association New Orleans, LA, October 16, 2013
- "Summary of 2013 Botanical Research Expert Panel Discussion." Meeting of the NIH Botanical Research Centers Directors, Baton Rouge, LA, November 5, 2013
- "APOE Genotype and Sports Concussion: Research and Application." Safe Kids Foundation, Washington, DC, November 25 2013
- "Current and Future Therapies in Alzheimer's Disease." Alzheimer's Disease International Second Annual Arab-North Africa Meeting. Dubai, United Arab Emirates (UAE), (invited) December 8, 2013
- "Alzheimer's Disease." Neuroscience Caucus, United States Congress, Washington, DC, February 26, 2014
- "The Brain Fights Back: Neuroplasticity in Health and Disease." Dr. William G. Luttge Lectureship in Neuroscience. Sponsored by the McKnight Brain Research Foundation. University of Florida College of Medicine, March 10, 2014
- "Alzheimer's Disease: Translational Research and Patient Centered Care." Department of Psychiatry and Behavioral Sciences, Division of Geriatric Psychiatry and Neuropsychiatry, The Johns Hopkins School of Medicine, March 17, 2014
- "Translational Alzheimer's Disease: from the Bench to Public Health Policy." Center for Neurodegenerative Disease Research, University of Pennsylvania Perelman School of Medicine, March 27, 2014
- "Translational Alzheimer's Disease: from the Bench to Public Health Policy." UC-Irvine Center for the Neurobiology of Learning and Memory (UC-MIND). University of California- Irvine, April 10, 2014
- "Current and Future Treatments of Alzheimer's Disease." 29th Meeting of Alzheimer's Disease International, San Juan, PR May 2, 2014.
- "Dietary Supplements and Caffeine in Prevention of Dementia." Institute of Medicine Workshop, Irvine, CA, June 9, 2014.
- "Sequelae of Traumatic Brain Injury: Searching for Mechanisms and a Denominator." Annual Meeting of the National NeuroTrauma Society (invited plenary); San Francisco, CA, June 30, 2014.

TEACHING EXPERIENCE AND RESPONSIBILITIESUniversity of Kentucky
Medical School

- Lecturer, ANA 516 (Neuroanatomy, 1st year) [Cortical anatomy, connectivity]
 Lecturer, NEU 821 (Clinical Neurosciences, 2nd year) [Behavioral Neurology, Memory & Dementia, Cortical Function, Headache]
 NEU 835, 3rd year clerkship for medical students

Graduate School

- NEU 851, Research Elective in Neurology (Course Director)
 CON 845, 4th year Neurology elective for medical students
 CON 818, 1st year medical students (Clinical-Anatomic Correlation)
 Masters and Doctoral Committees, Departments of Anatomy and Psychology
 Lecturer, PGY 630 (Biology of Aging)
 Lecturer, NEU 605 (Graduate Studies in Neuroscience)

Neurology Residency Program

- Residency Program Director, June 1985-April 1987
 Consultation & ward attending (adult and pediatric neurology) rotations, 1979 - 1990
 Special consultations: Disorders of higher cortical function, 1979 - 1990

University of Pittsburgh
Medical School

- Lecturer, Introduction to Medicine (Dementia and Behavioral Disorders)
 Lecturer, Small Group Leader, Problem based Learning Group Leader, Integrated Neuroscience Course

Graduate School

- Doctoral Students, Department of Neurobiology
 Peter Miller, M.D., Ph.D. (Ph.D. received 1993)

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Kevin Taffe 1995-1999 (M.D.-Ph.D. Program)

Mark O'Malley 1996-1999

Barbara Isanski 2005-2008

Postdoctoral Fellows: Scot D. Styren, Ph.D.(1994-1997)

James Goss, Ph.D. (1993-1996)

John Cialella, Ph.D. (1997-2000)

Eric Abrahamson, Ph.D. (2001-present)

Clinical Postdoctoral Fellows: David Martin, M.D. (1990-1991)

Mahmood Usman, M.D. (1991-1992)

Karyn Catt, M.D. (1996-1998)

Dissertation Committees:

1998-2000

Faridis Serrano

Department of Neuroscience

1998-2000

Xiao Yan Wong

Department of Human Genetics,

1998-2000

Peijun Chen, M.D., MPH

Graduate School of Public Health

Department of Epidemiology,

Graduate School of Public Health

1999-2001

Shannon Lindsay

Department of Human Genetics,

1999-2002

Erin Lueddecking

Graduate School of Public Health

Department of Human Genetics,

2000-2003

Purnima Desai

Graduate School of Public Health

2007-2008

Jessica Figgins

Department of Human Genetics

Graduate School of Public Health

NIH K-Award Mentor or Co-MentorCurrently

1999-2003

Carolyn Meltzer, MD, PhD

Professor and Chair

Department of Radiology,

Emory University School of Medicine

2002-2005

James Gebel, MD

Associate Professor and Chief, Stroke

Institute, University of Louisville School of

Medicine

2006-2008

Wes Farris, MD

Assistant Professor of Neurology, University of

2006-2008

David Wolk, MD

Pittsburgh

Assistant Professor of Neurology, University of

Pennsylvania

Lecturer, Biological Bases of Neuropsychiatry, 1993, 1994, 1995, 1996, 1997, 1999, 2000, 2002, 2004, 2006, 2008

Cellular and Molecular Bases of Neuroscience: Molecular and Neuropathologic Mechanisms in Alzheimer's Disease (1998)

Neurology Residency ProgramSpecial consultations: Disorders of higher cortical function & neuropsychiatry, 1990-2008
Resident's Conferences: Limbic system, Mental Status Exam, Dementia, AphasiaPsychiatry Residency Program

Geriatric Psychiatry Inpatient Unit, Attending Consultant

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Seminars and Case Presentations in behavioral neurology and neuropsychiatry

University of Virginia

Lecturer, Department of Biology, Biology 4040 - Laboratory in Cell Biology, Spring 2010, 2011, 2012

Seminars and Case Presentations in behavioral neurology and neuropsychiatry

Alzheimer's Disease lecture, First Year Medical Students, 2010

Grand Rounds: Neurology, Family Medicine, Internal Medicine, Biomedical Engineering, 2010, 2011, 2012

CURRENT AND IMMEDIATE PAST RESEARCH FUNDING (annual direct costs)

* = Research continuing at the University of Virginia

	<u>Years</u>	<u>Annual Direct Costs</u>
*NIA AG05133		
Alzheimer Disease Research Center (O. Lopez, PI) UVA Satellite Clinic (Leader)	4/1/10-3/31/15	\$ 19,200
*NIH AG025204 (W. Klunk, PI)		
<i>In Vivo</i> PIB PET Amyloid Imaging: Normals, MCI & Dementia	5/1/10-4/30/15	
Project #4: Modulators of Cognitive Transition From Normal to MCI (Co-Investigator)		\$ 9,511
Project #5: Modulators of Cognitive Transition From MCI to AD (Co-Investigator)		\$ 5,156
Project #6: Quantitative Neuropathological Correlates of <i>In Vivo</i> PiB Retention (Co-Investigator)		\$ 9,511
<u>Principal Investigator</u>		
*NIA AG05133		
Alzheimer Disease Research Center [Administrative Core Director, Clinical Core Director]	5/1/75-8/31/08	\$ 1,443,367
ADRC—Imaging Core Supplement	5/1/05-8/31/08	\$ 100,000
ADRC—Data Management Supplement	5/1/05-8/31/08	\$ 100,000
*NCCAM/NIA AT00162		
Ginkgo Biloba Prevention Trial in Older Individuals	9/30/99-7/31/10	\$ 3,612,900
*NIH AG025204		
<i>In Vivo</i> PIB PET Amyloid Imaging: Normals, MCI & Dementia	5/15/05-8/31/08	\$ 731,123
SAP 4100027294 (Commonwealth of Pennsylvania Grant)		
Detection, Diagnosis and Intervention in Dementia	6/1/05-8/31/08	\$ 1,060,512

Project Principal Investigator

*NIA AG14449 (E. Mufson, PI; ST DeKosky, Project Leader)		
Neurobiology of Mild Cognitive Impairment in the Elderly	4/1/07-3/31/12	\$ 303,366
Project: NIH Synaptic, cholinergic and amyloid alterations in mild cognitive impairment (Pitt DC's)		
*NINDS NS30318 (E. Dixon, PI)		
Brain Trauma Research Center	5/11/00-6/30/11	\$ 102,152
Project: Traumatic Brain Injury, Amyloid Metabolism and Statin Therapy		
*NIH AG025204 (W. Klunk, PI)		
<i>In Vivo</i> PIB PET Amyloid Imaging: Normals, MCI & Dementia	9/1/08-4/30/10	\$ 731,123

Co-Investigator

*NIH AG023651

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Mild Cognitive Impairment: A Prospective Community Study
(M. Ganguli, PI)

9/1/05-8/31/10

\$ 29,166

Prior Research Funding (University of Pittsburgh and University of Kentucky): Available upon request.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.PUBLICATIONS

- DeKosky, S.T., Heilman, K.M., Bowers, D. and Valenstein, E.: Recognition and discrimination of emotional faces and pictures. *Brain and Language* 9:206-214, 1980.
- DeKosky, S.T., and Bass, N.H.: Effects of aging and senile dementia on the microchemical pathology of human cerebral cortex. In Amaducci, L., Davison, A.N. and Antuono, P. (eds.) *Aging of the Brain and Dementia (Aging, Vol. 13)*. New York, Raven Press, 1980, 33-37.
- DeKosky, S.T., and Bass, N.H.: Aging, senile dementia, and the intralaminar microchemistry of cerebral cortex. *Neurology* 32:1227-1233, 1982.
- DeKosky, S.T., Nonneman, A.J., and Scheff, S.W.: Morphologic and behavioral effects of perinatal glucocorticoid administration. *Physiology and Behavior* 29:895-900, 1982.
- Scheff, S.W., and DeKosky, S.T.: Steroid suppression of axon sprouting in the hippocampal dentate gyrus of the adult rat: Dose-response relationship. *Experimental Neurology* 82:183-191, 1983.
- DeKosky, S.T., Scheff, S.W., and Cotman, C.W.: Elevated corticosterone levels: A possible cause of reduced axon sprouting in aged animals. *Neuroendocrinology*, 38:33-38, 1984.
- DeKosky, S.T., and Bass, N.H.: Biochemistry of senile dementia. In Lajtha, A. (ed.) *Handbook of Neurochemistry*, 2nd Edition. New York:Plenum Press, 1985, 617-650.
- Scheff, S.W., Anderson, K.J., and DeKosky, S.T.: Strain comparison of synaptic density in hippocampal CA1 of aged rats. *Neurobiology of Aging*, 6:29-34, 1985.
- DeKosky, S.T., Scheff, S.W., and Markesberry, W.R.: Laminar organization of cholinergic circuits in human frontal cortex in Alzheimer's Disease and aging. *Neurology*, 35:1425-1431, 1985.
- DeKosky, S.T., Scheff, S.W., Hackney, C.G., and Bass, N.H. Strain differences and laminar localization of structural neurochemical changes in aging rat. *Neurobiology of Aging*, 6:277-286, 1985.
- Vicedomini, J.P., Nonneman, A.J., DeKosky, S.T., and Scheff, S.W. Perinatal glucocorticoids alter dentate gyrus electrophysiology. *Brain Research Bulletin*, 15:111-116, 1985.
- Vicedomini, J.P., Nonneman, A.J., DeKosky, S.T., and Scheff, S.W. Perinatal glucocorticoids disrupt learning: A sexually dimorphic response. *Physiology and Behavior*, 36:145-149, 1986.
- Slevin, J.T., and DeKosky, S.T.: Stability of sialogangliosides in kindled hippocampus. *Experimental Neurology*, 91:208-211, 1986.
- Anderson, K.J., Scheff, S. W., and DeKosky, S.T. Reactive synaptogenesis in hippocampal area CA1 of aged and young adult rats. *J. Comparative Neurology*, 252:374-384, 1986.
- Morse, J., Scheff, S.W., and DeKosky, S.T. Gonadal steroids influence axon sprouting in the hippocampal dentate gyrus: A sexually dimorphic response. *Experimental Neurology*, 94:649-658, 1986.
- Slevin, J.T., Sparks, D.L., Dempsey, R.J., Davis, D.G., Hunsaker, J.C., and DeKosky, S.T. Altered striatal dopaminergic metabolism 36 hours after unilateral trauma to the human mesencephalon. *Neurology*, 37:322-325, 1987.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- Shih, W.J., Markesberry, W.R., Clark, D.B., Goldstein, S., Domstad, P., Coupal, J.J., Kung, H., DeKosky, S.T. and DeLand, F. I-123 HIPDM brain imaging findings in sub-acute spongiform encephalopathy (Creutzfeld-Jakob disease). *J. Nuclear Medicine* 28:1484-1487, 1987.
- Scheff, S.W., Morse, J.K., and DeKosky, S.T. Hydrocortisone differentially alters lesion-induced axon sprouting in male and female rats. *Experimental Neurology* 100:237-241, 1988.
- Scheff, S.W., Morse, J.K., and DeKosky, S.T. Neurotrophic effects of steroids on lesion-induced growth in the hippocampus. I. The asteroidal condition. *Brain Research* 457:246-250, 1988.
- Sparks, D.L., DeKosky, S.T., and Markesberry, W.R. Alzheimer's Disease: Aminergic-cholinergic alterations in hypothalamus. *Archives of Neurology* 45:994-999, 1988.
- DeKosky, S.T., Scheff, S.W., and Hackney, C.G.: Acetylcholine synthesis in human CSF: Implications for study of central cholinergic metabolism. *Neurochemical Research* 14: 191-196, 1989.
- Harbaugh, R.E., Reeder, T.M., Senter, H.J., Knopman, D.S., Baskin, D.S., Pirozzolo, F., Chui, H.C., Shetter, A.G., Bakay, R.A., Leblanc, R., Watson, R.T., DeKosky, S.T., Read, S.L., Schmitt, F.A., and Johnston, J.T. Intracerebroventricular bethanechol chloride infusion in Alzheimer's disease: Results of a collaborative, double-blind study. *Journal of Neurosurgery* 71:481-486, 1989.
- Scheff, S.W., and DeKosky, S.T. Glucocorticoid suppression of lesion-induced synaptogenesis: Effect of temporal manipulation of steroid treatment. *Experimental Neurology* 105:260-264, 1989.
- Schmitt, F.A., Ranseen, J.D., and DeKosky, S.T.: Cognitive mental status examinations. *Clinics in Geriatric Medicine* 5:545-564, 1989.
- Scheff, S.W., DeKosky, S.T., and Price, D.A.: Quantitative assessment of cortical synaptic density in Alzheimer's Disease. *Neurobiology of Aging* 11:29-37, 1990.
- DeKosky, S.T., Shih, W-J., Schmitt, F.A., Coupal, J., and Kirkpatrick, C. Assessing utility of single photon emission computerized tomography (SPECT) scan in Alzheimer's disease: Correlation with cognitive severity. *Alzheimer's Disease and Related Disorders: An International Journal* 4:14-23, 1990.
- DeKosky, S.T. Biochemical and neuropathological aspects of Alzheimer's disease. *Current Opinion in Neurology and Neurosurgery* (A. Kertesz, Volume Editor) 3:84-89, 1990.
- DeKosky, S.T. and Scheff, S.W. Synapse loss in frontal cortex biopsies in Alzheimer's disease: Correlation with cognitive severity. *Annals of Neurology* 27:457-464, 1990.
- Shih, W-J., DeKosky, S.T., Coupal, J.J., Simmons, G., Pulmano, C., Kung, H.F., Ryo, U.Y., and Clark, D.B. I-123 Hydroxyiodobenzyl Propanediamine (HIPDM) cerebral blood flow imaging demonstrating transtentorial diaschisis. *Clinical Nuclear Medicine* 15:623-629, 1990.
- Scheff, S.W., Scott, S.A., and DeKosky, S.T. Quantitation of synaptic density in the septal nuclei of young and aged Fischer 344 rats. *Neurobiology of Aging* 12:3-12, 1991.
- DeKosky, S.T. Review of *Subcortical Dementia* (J. Cummings, Editor) *Journal of Neuropathology and Experimental Neurology* 50:184, 1991.
- Scott, S.A., DeKosky, S.T., and Scheff, S.W. Volumetric atrophy of the amygdala in Alzheimer's disease: Quantitative serial reconstruction. *Neurology* 41:351-356, 1991.
- Schmitt, F. A. Shih, W-J., and DeKosky, S. T. Neuropsychological correlates of single photon emission computed tomography [SPECT] in Alzheimer's disease. *Neuropsychology* 6:159-171, 1992.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- Sparks, D.L., Hunsaker, J.D., Slevin, J.T., DeKosky, S.T., Kryscio, R.J., Markesberry, W.R. Monoaminergic and cholinergic synaptic markers in the nucleus basalis of Meynert (nbM): Normal age related changes and the effect of heart disease and Alzheimer's disease. *Annals of Neurology*, 31:611-620, 1992.
- Scott, S.A., DeKosky, S.T., Sparks, D.L., Knox, C.A., and Scheff, S.W. Amygdala cell loss and atrophy in Alzheimer's disease. *Annals of Neurology* 32:555-563, 1992.
- DeKosky, S.T., Harbaugh, R.E., Schmitt, F.A., Bakay, R.A.E., Chui, H.C., Knopman, D.S., Reeder, T.M., Shetter, A.G., Senter, H.J., Markesberry, W.R., and the Intraventricular Bethanechol Study Group. Cortical biopsy in Alzheimer's disease: Diagnostic accuracy and neurochemical, neuropathological and cognitive correlations. *Annals of Neurology* 32:625-632, 1992.
- Morse, J.K., DeKosky, S.T., and Scheff, S.W. Neurotrophic effects of steroids on lesion-induced growth in the hippocampus. II. Hormone replacement. *Experimental Neurology* 118:47-52, 1992.
- Miller, P.D., Chung, W-W., Lagenaar, C.F., and DeKosky, S.T. Regional distribution of neural cell adhesion molecule (N-CAM) and L1 in human and rodent hippocampus. *Journal of Comparative Neurology* 327:341-349, 1993.
- Palmer, A.M. and DeKosky, S.T.: Monoamine neurons in aging and Alzheimer's disease. *Journal of Neural Transmission* 91:135-159, 1993.
- Styren, S.D., DeKosky, S.T., Rogers, J., and Mufson, E.J. Epidermal growth factor receptor expression in demented elderly: Localization to vascular endothelial cells of brain, pituitary, and skin. *Brain Research* 615:181-190, 1993.
- Rosen, J., Colantonio, A., Becker, J.T., Lopez, O.L., DeKosky, S.T., and Moss, H.B. Effects of a history of heavy alcohol consumption on Alzheimer's disease. *British Journal of Psychiatry* 163:358-363, 1993.
- Palmer, A.M., Marion, D.W., Botscheller, M.L., Swedlow, P.E., Styren, S.D., and DeKosky, S.T. Traumatic brain injury-induced excitotoxicity assessed in a controlled cortical impact model. *Journal of Neurochemistry* 61:2015-2024, 1993.
- Lopez, O.L., Becker, J.T., and DeKosky, S.T.: Dementia accompanying motor neuron disease. *Dementia* 5:42-47, 1994.
- Miller, P.D., Styren, S.D., Lagenaar, C.F., and DeKosky, S.T.: Embryonic neural cell adhesion molecule (N-CAM) is elevated in the denervated rat dentate gyrus. *Journal of Neuroscience* 14:4217-4225, 1994.
- Lopez, O.L., Becker, J.T., Somsak, D., Dew, M.A., and DeKosky, S.T. Awareness of cognitive deficits and anosognosia in probable Alzheimer's disease. *European Neurology* 34:277-282, 1994.
- Styren, S.D., Lagenaar, C.F., Miller, P.D., and DeKosky, S.T. Rapid expression and transport of embryonic N-CAM in dentate gyrus following entorhinal cortex lesion: Ultrastructural analysis. *Journal of Comparative Neurology* 349:486-492, 1994.
- Chandra, V., Ganguli, M., Ratcliff, G., Pandav, R., Sharma, S., Gilby, J., Belle, S., Ryan, C., Baker, C., Seaberg, E., DeKosky, S., and Nath, L. Studies of the epidemiology of dementia: Comparisons between developed and developing countries. *Aging/Clinical and Experimental Research* 6:307-321, 1994.
- Palmer, A.M., Marion, D.W., Botscheller, M.L., Bowen, D.M., and DeKosky, S.T. Increased transmitter amino acid concentration in human ventricular CSF after brain trauma. *NeuroReports* 6:153-156, 1994.
- Becker, J.T., Mintun, M.A., Diehl, D.J., Dobkin, J., Martidis, A., Madoff, D.C., and DeKosky, S.T. Functional neuroanatomy of verbal free recall: A replication study. *Human Brain Mapping* 1:284-292, 1994.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- DeKosky, S.T., Goss, J.R., Miller, P.D., Styren, S.D., Kochanek, P.M., and Marion, D. Upregulation of nerve growth factor following cortical trauma. *Experimental Neurology* 130:173-177, 1994.
- Lopez, O.L., Larumbe, M.R., Becker, J.T., Rezek, D., Rosen, J., Klunk, W., and DeKosky, S.T. Reliability of NINDS-AIREN clinical criteria for the diagnosis of vascular dementia. *Neurology* 44:1240-1245, 1994.
- Zhang, W., Kochanek, P., Styren, S., DeKosky, S., and Ho, C. Differentiation between tissue edema and infarct after traumatic brain injury in rats using T2 and perfusion MRI. Second Meeting of Society of Magnetic Resonance 1384, 1994.
- Styren, S.D., Miller, P.D., Lagenaur, C.F., and DeKosky, S.T. Alternate strategies in lesion-induced reactive synaptogenesis: Differential expression of L1 in two populations of sprouting axons. *Experimental Neurology* 131:165-173, 1995.
- Ganguli, M., Ratcliff, G., Chandra, V., Sharma, S., Gilby, J., Pandav, R., Belle, S., Ryan, C., Baker, C., Seaberg, E., and DeKosky, S.T. A Hindi version of the MMSE: The development of a cognitive screening instrument for a largely illiterate rural elderly population in India. *International Journal of Geriatric Psychiatry* 10:367-377, 1995.
- Ganguli, M., Cauley, J.A., DeKosky, S.T., and Kamboh, M.I. Dementia among elderly apolipoprotein type 4/4 homozygotes: A prospective study. *Genetic Epidemiology* 12:309-311, 1995.
- Goss, J.R., Styren, S.D., Kochanek, P.M., Palmer, A.M., Marion, D.W., and DeKosky, S.T. Hypothermia attenuates the normal increase in interleukin-1 β RNA and nerve growth factor following traumatic brain injury in the rat. *Journal of Neurotrauma* 12:159-167, 1995.
- Kamboh, M.I., Sanghera, D.K., Ferrell, R.E., and DeKosky, S.T. Alzheimer's disease risk associated with APOE-4 is modified by alpha 1-antichymotrypsin genetic polymorphism. *Nature Genetics* 10:486-488, 1995.
- Lopez, O.L., Becker, J.T., Jungreis, C.A., Rezek, D., Estol, C., Boller, F., and DeKosky, S.T. Computed tomography—but not magnetic resonance imaging—identified periventricular white-matter lesions predict symptomatic cerebrovascular disease in probable Alzheimer's disease. *Archives of Neurology* 52:659-664, 1995.
- Lopez, O.L., Becker, J.T., Klunk, W., and DeKosky, S.T. The nature of behavioral disorders in human Kluver-Bucy syndrome. *Neuropsychiatry, Neuropsychology, and Behavioral Neurology* 8:215-221, 1995.
- Lopez, O.L., Brenner, R.P., Becker, J.T., Jungreis, C.A., Rezek, D., and DeKosky, S.T. Electroencephalographic correlates of periventricular white matter lesions in probable Alzheimer's disease. *Dementia* 6:343-347, 1995.
- Kamboh, M.I., and DeKosky, S.T. Apolipoprotein E genotyping in the diagnosis of Alzheimer's disease. *Annals of Neurology* 38:967-969, 1995.
- Kochanek, P.M., Marion, D.W., Zhang, W., Schiding, J.K., White, M., Palmer, A.M., Clark, R.S.B., O'Malley, M.E., Styren, S.D., Ho, C., and DeKosky, S.T. Severe controlled cortical impact in rats: Assessment of cerebral edema, blood flow, and contusion volume. *Journal of Neurotrauma* 12:1015-1025, 1995.
- Lopez, O.L., Gonzalez, M.P., Becker, J.T., Reynolds, C.F., Sudilovsky, A., and DeKosky, S.T. Symptoms of depression in Alzheimer's disease, frontal lobe-type dementia, and subcortical dementia. *Annals of the New York Academy of Sciences* 769:389-392, 1995.
- DeKosky, S.T. Searching for the holy grail: What is the structural correlate of cognition? *Neurobiology of Aging* 16:298-300, 1995.
- Ganguli, M., Seaberg, E.C., Ratcliff, G.G., Belle, S.H., and DeKosky, S.T. Cognitive stability over two years in a rural elderly population: The MoVIES Project. *Neuroepidemiology* 15:42-50, 1996.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- DeKosky, S.T., Styren, S.D., O'Malley, M.E., Goss, J.R., Kochanek, P., Marion, D., Evans, C.H., and Robbins, P.D. Interleukin-1 receptor antagonist suppresses neurotrophin response in injured rat brain. *Annals of Neurology* 39:123-127, 1996.
- Clark, R.S.B., Kochanek, P.M., Marion, D.W., Schiding, J.K., White, M., Palmer, A.M., and DeKosky, S.T. Mild posttraumatic hypothermia reduces mortality after severe controlled cortical impact in rats. *Journal of Cerebral Blood Flow and Metabolism* 16:253-261, 1996.
- Becker, J.T., Mintun, M.A., Aleva, K., Wiseman, M.B., Nichols, T., and DeKosky, S.T. Compensatory reallocation of brain resources supporting verbal episodic memory in Alzheimer's disease. *Neurology* 46:692-700, 1996.
- Lopez, O.L., Gonzalez, M.P., Becker, J.T., Reynolds, C.F., Sudilovsky, A., and DeKosky, S.T. Symptoms of depression and psychosis in Alzheimer's disease and frontotemporal dementia: Exploration of underlying mechanisms. *Neuropsychiatry, Neuropsychology, and Behavioral Neurology* 3:154-161, 1996.
- Clark, R.S.B., Carlos, T.M., Schiding, J.K., Bree, M., Fireman, L.A., DeKosky, S.T., and Kochanek, P.M. Antibodies against Mac-1 attenuate neutrophil accumulation after traumatic brain injury in rats. *Journal of Neurotrauma* 13:333-341, 1996.
- Meador, K.J., Loring, D.W., Sethi, K.D., Yaghmai, F., Styren, S.D., and DeKosky, S.T. Dementia associated with dorsal midbrain lesion. *Journal of the International Neuropsychological Society* 2:359-367, 1996.
- Ganguli, M., Burmeister, L.A., Seaberg, E.C., Belle, S., and DeKosky, S.T. Association between dementia and elevated TSH: A community-based study. *Biological Psychiatry* 40:714-725, 1996.
- Belle, S.H., Seaberg, E.C., Ganguli, M., Ratcliff, G., DeKosky, S., and Kuller, L.H. Effect of education and gender adjustment on the sensitivity and specificity of a cognitive screening battery for dementia: Results from the MoVIES project. *Neuroepidemiology* 15:321-329, 1996.
- Herbster, A.N., Nichols, T., Wiseman, M.B., Mintun, M.A., DeKosky, S.T., and Becker, J.T. Functional connectivity in auditory-verbal short-term memory in Alzheimer's disease. *NeuroImage* 4:67-77, 1996.
- DeKosky, S.T., Aston, C.E., and Kamboh, M.I. Polygenic determinants of Alzheimer's disease: Modulation of risk by alpha 1-antichymotrypsin. *Annals New York Academy of Sciences* 802:27-34, 1996.
- DeKosky, S.T., Scheff, S.W., and Styren, S.D. Structural correlates of cognition in dementia: Quantification and assessment of synapse change. *Neurodegeneration* 5:417-421, 1996.
- Lopez, O.L., Kaufer, D., Reiter, C.T., Carra, J., DeKosky, S.T., and Palmer, A.M. Relationship between CSF neurotransmitter metabolites and aggressive behavior in Alzheimer's disease. *European Journal of Neurology* 3:153-155, 1996.
- Rosomoff, H.L., Kochanek, P.M., Clark, R., DeKosky, S.T., Ebmeyer, U., Grenvik, A.N., Marion, D.W., Obrist, W., Palmer, A.M., Safar, P. and White, R.J. Resuscitation from severe brain trauma. *Critical Care Medicine* 24:S48-56, 1996.
- Becker, J.T., Mintun, M.A., Aleva, K., Wiseman, M.B., Nichols, T. and DeKosky, S.T. Alterations in functional neuroanatomical connectivity in Alzheimer's disease: Positron emission tomography of auditory verbal short-term memory. *Annals of the New York Academy of Sciences* 777:239-242, 1996.
- Marion, D.W., Penrod, L.E., Kelsey, S.F., Obrist, W.D., Kochanek, P.M., Palmer, A.M., Wisniewski, S.R., and DeKosky, S.T. Treatment of traumatic brain injury with moderate hypothermia. *The New England Journal of Medicine* 336:540-546, 1997.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Kamboh, M.I., Sanghera, D.K., Aston, C.E., Bunker, C.H., Hamman, R.F., Ferrell, R.E., and DeKosky, S.T. Gender-specific nonrandom association between the alpha 1-antichymotrypsin and apolipoprotein E polymorphisms in the general population and its implications for the risk of Alzheimer's disease. *Genetic Epidemiology* 14:169-180, 1997.

Kamboh, M.I., Aston, C.E., Ferrell, R.E., and DeKosky, S.T. Genetic effect of alpha 1-antichymotrypsin on the risk of Alzheimer disease. *Genomics* 41:382-385, 1997.

Lopez, O.L., Becker, J.T., Reynolds, C.F., Jungreis, C.A., Weinman, S., and DeKosky, S.T. Psychiatric correlates of MR deep white-matter lesions in probable Alzheimer's disease. *The Journal of Neuropsychiatry and Clinical Neurosciences* 9:246-250, 1997.

Ganguli, M., Ratcliff, G., and DeKosky, S.T. Cognitive test scores in community-based older adults with and without dementia. *Aging and Mental Health* 1:176-180, 1997.

Goss, J.R., Taffe, K.M., Kochanek, P.M., and DeKosky, S.T. The antioxidant enzymes glutathione peroxidase and catalase increase following traumatic brain injury in the rat. *Experimental Neurology* 146:291-294, 1997.

Kordower, J.H., Styren, S., Clarke, M., DeKosky, S.T., Olanow, C.W., and Freeman, T.B. Fetal grafting for Parkinson's disease: Expression of immune markers in two patients with functional fetal nigral implants. *Cell Transplantation* 3:213-219, 1997.

Bell, M.J., Kochanek, P.M., Doughty, L.A., Carcillo, J.A., Adelson, P.D., Clark, R.S.B., Wisniewski, S.R., Whalen, M.J., and DeKosky, S.T. Interleukin-6 and interleukin-10 in cerebrospinal fluid after severe traumatic brain injury in children. *Journal of Neurotrauma* 14:451-457, 1997.

Lopez, O.L., Wisnieski, S.R., Becker, J.T., Boller, F., and DeKosky, S.T. Extrapyramidal signs in patients with probable Alzheimer's disease. *Archives of Neurology* 54:969-975, 1997.

Styren, S.D., Bowser, R., and DeKosky, S.T. Expression of fetal ALZ-50 reactive clone 1 (FAC1) in dentate gyrus following entorhinal cortex lesion. *Journal of Comparative Neurology* 386:555-561, 1997.

Forbes, M.L., Hendrich, K.S., Kochanek, P.M., Williams, D.S., Schiding, J.K., Wisniewski, S.R., Kelsey, S.F., DeKosky, S.T., Graham, S.H., Marion, D.W., and Ho, C. Assessment of cerebral blood flow and CO₂ reactivity after controlled cortical impact by perfusion magnetic resonance imaging using arterial spin-labeling in rats. *Journal of Cerebral Blood Flow and Metabolism* 17:865-874, 1997.

Whalen, M.J., Carlos, T.M., Clark, R.S.B., Marion, D.W., DeKosky, S.T., Heineman, S., Schiding, J.K., Memarzadeh, F., and Kochanek, P.M. The effect of brain temperature on acute inflammation after traumatic brain injury in rats. *Journal of Neurotrauma* 14:561-572, 1997.

Small, G.W., Rabins, P.V., Barry, P.P., Buckholtz, N.S., DeKosky, S.T., et al. Diagnosis and treatment of Alzheimer disease and related disorders: Consensus statement of the American Association for Geriatric Psychiatry, the Alzheimer's Association, and the American Geriatrics Society. *Journal of the American Medical Association* 278:1363-1371, 1997.

Bell, M.J., Kochanek, P.M., Doughty, L.A., Carcillo, J.A., Adelson, P.D., Clark, R.S.B., Whalen, M.J., and DeKosky, S.T. Comparison of the interleukin-6 and interleukin-10 response in children after severe traumatic brain injury or septic shock. *Acta Neurochir (Suppl.)* 70:96-97, 1997.

Whalen, M.J., Carlos, T.M., Clark, R.S.B., Marion, D.W., DeKosky, S.T., Heineman, S., Schiding, J.K., Memarzadeh, F., Dixon, C.E., and Kochanek, P.M. The relationship between brain temperature and neutrophil accumulation after traumatic brain injury in rats. *Acta Neurochir (Suppl.)* 70:260-261, 1997.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- Lopez, O.L., Kamboh, M.I., Becker, J.T., Kaufer, D.I., and DeKosky, S.T. The apolipoprotein E E4 allele is not associated with extrapyramidal signs or psychiatric symptoms in probable Alzheimer's disease. *Neurology* 49:794-797, 1997.
- Lopez, O.L., Brenner, R.P., Becker, J.T., Ulrich, R.F., Boller, F., and DeKosky, S.T. EEG spectral abnormalities and psychosis as predictors of cognitive and functional decline in probable Alzheimer's disease. *Neurology* 48:1521-1525, 1997.
- Forbes, M.L., Hendrich, K.S., Schidling, J.K., Williams, D.S., Ho, C., DeKosky, S.T., Marion, D.W. and Kochanek, P.M. Perfusion MRI assessment of cerebral blood flow and CO₂ reactivity after controlled cortical impact in rats. *Advances in Experimental Medicine and Biology* 411:7-12, 1997.
- Clark, R.S., Kochanek, P.M., Dixon, C.E., Chen, M., Marion, D.W., Heineman, S., DeKosky, S.T. and Graham, S.H. Early neuropathologic effects of mild or moderate hypoxemia after controlled cortical impact injury in rats. *Journal of Neurotrauma* 14:179-189, 1997.
- Styren, S.D., Styren, G.C., and DeKosky, S.T. Epidermal growth factor receptor expression in skin does not predict dementia in the elderly. *Dementia and Geriatric Cognitive Disorders* 9:20-23, 1998.
- Kaufer, D.I., Cummings, J.L., Christine, D., Bray, T., Castellon, S., Masterman, D., MacMillan, A., Ketchel, P., and DeKosky, S.T. Assessing the impact of neuropsychiatric symptoms in Alzheimer's disease: The Neuropsychiatric Inventory Caregiver Distress Scale. *Journal of the American Geriatric Society* 46:210-215, 1998.
- Kamboh, M.I., Aston, C.E., and DeKosky, S.T. Association between ACT polymorphism and Alzheimer's disease. *Neurology* 50:574-576, 1998.
- Goss, J.R., O'Malley, M.E., Zou, L., Styren, S.D., Kochanek, P.M., and DeKosky, S.T. Astrocytes are the major source of nerve growth factor upregulation following traumatic brain injury in the rat. *Experimental Neurology* 149:301-309, 1998.
- Forbes, M.L., Clark, R.S.B., Dixon, C.E., Graham, S.H., Marion, D.W., DeKosky, S.T., Schidling, J.K., and Kochanek, P.M. Augmented neuronal death in CA3 hippocampus following hyperventilation early after controlled cortical impact. *Journal of Neurosurgery* 88:549-556, 1998.
- Kamboh, M.I., Ferrell, R.E., and DeKosky, S.T. Genetic association studies between Alzheimer's disease and two polymorphisms in the low density lipoprotein receptor-related protein gene. *Neuroscience Letters* 244:65-68, 1998.
- Meltzer, C.D., Smith, G., DeKosky, S.T., Pollock, B.P., Mathis, C.A., Moore, R.Y., Kupfer, D.J., and Reynolds, C.F. Serotonin in aging, late-life depression, and Alzheimer's disease: The emerging role of functional imaging. *Neuropsychopharmacology* 18:407-430, 1998.
- Styren, S.D., Kamboh, M.I., and DeKosky, S.T. Expression of differential immune factors in temporal cortex and cerebellum: The role of alpha-1-antichymotrypsin, apolipoprotein E and reactive glia in the progression of Alzheimer's disease. *Journal of Comparative Neurology* 396:511-520, 1998.
- Sinz, E.H., Kochanek, P.M., Heyes, M.P., Wisniewski, S.R., Bell, M.J., Clark, R.S.B., DeKosky, S.T., Blight, A.R., and Marion, D.W. Quinolinic acid is increased in CSF and associated with mortality after traumatic brain injury in humans. *Journal of Cerebral Blood Flow Metabolism* 18:610-615, 1998.
- Lopez, O.L., Brenner, R., Becker, J.T., Ulrich, R., Boller, F., and DeKosky, S.T. Electroencephalography and survival in Alzheimer's disease. *Neurology* 51:918-919, 1998.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- Chandra, V., DeKosky, S.T., Pandav, R., Johnston, J., Belle, S.H., Ratcliff, G., and Ganguli, M. Neurologic factors associated with cognitive impairment in a rural elderly population in India: The Indo-US Cross National Dementia Epidemiology Study. *Journal of Geriatric Psychiatry and Neurology* 11:11-17, 1998.
- DeKosky, S.T., Kochanek, P.M., Clark, R.S.B., Ciallella, J.R., and Dixon, C.E. Secondary injury after head trauma: Subacute and long-term mechanisms. *Seminars in Clinical Neuropsychiatry* 3:176-185, 1998.
- Forbes, M.L., Clark, R.S., Dixon, C.E., Graham, S.H., Marion, D.W., DeKosky, S.T., Schidling, J.K., and Kochanek, P.M. Augmented neuronal death in CA3 hippocampus following hyperventilation early after controlled cortical impact. *J. of Neurosurgery* 88:549-556, 1998.
- Zou, L., Burmeister, L.A., Styren, S.D., Kochanek, P.M., and DeKosky, S.T. Up-regulation of type 2 iodothyronine deiodinase mRNA in reactive astrocytes following traumatic brain injury in the rat. *Journal of Neurochemistry* 71:887-890, 1998.
- Ciallella, J.R., Yan, H.Q., Ma, X., Wolfson, B.M., Marion, D.W., DeKosky, S.T., and Dixon, C.E. Chronic effects of traumatic brain injury on hippocampal vesicular acetylcholine transporter and M2 muscarinic receptor protein in rats. *Experimental Neurology* 152:11-19, 1998.
- Sweet, R.A., Nimgaonkar, V.L., Kamboh, M.I., Lopez, O.L., Zhang, F., and DeKosky, S.T. Dopamine receptor genetic variation, psychosis, and aggression in Alzheimer disease. *Archives of Neurology* 55:1335-1340, 1998.
- Montoya, S.E., Aston, C.E., DeKosky, S.T., Kamboh, M.I., Lazo, J.S., and Ferrell, R.E. Bleomycin hydrolase is associated with risk of sporadic Alzheimer's disease. *Nature Genetics* 18:1-2, 1998.
- Mayeux, R., Saunders, A.M., Shea, S., Mirra, S., Evans, D., Roses, A.D., Hyman, B.T., Cain, B., Tang, M.X., Phelps, C.H., and the Alzheimer's Disease Centers Consortium on APOE and Alzheimer's Disease.* (DeKosky, S.T. for the University of Pittsburgh). Utility of the apolipoprotein-E genotype in the diagnosis of Alzheimer's disease. *New England Journal of Medicine* 338:506-511, 1998.
- Wang, X., DeKosky, S.T., Wisniewski, S., Aston, C.E., and Kamboh, M.I. Genetic association of two chromosome 14 genes (Presenilin 1 and alpha 1 antichymotrypsin) with Alzheimer's disease. *Annals of Neurology* 44:387-390, 1998.
- Whalen, M.J., Carlos, T.M., Kochanek, P.M., Wisniewski, S.R., Bell, M.J., Carcillo, J.A., Clark, R.S.B., DeKosky, S.T., and Adelson, P.D. Soluble adhesion molecules in CSF are increased in children with severe head injury. *Journal of Neurotrauma* 15:777-787, 1998.
- Kaufer, D.I., Catt, K.E., Lopez, O.L., and DeKosky, S.T. Dementia with Lewy bodies: Response of delirium-like features to donepezil. *Neurology* 51:1512, 1998.
- Chandra, V., Ganguli, M., Pandav, R., Johnston, J., Belle, S., and DeKosky, S.T. Prevalence of Alzheimer's disease and other dementias in rural India: The Indo-US Cross-National Dementia Epidemiology Study. *Neurology* 51:1000-1008, 1998.
- Meltzer, C.C., Smith, G., Price, J.C., Reynolds, C.F., Mathis, C.A., Greer, P., Lopresti, B., Pollock, B.G., Ben-Eliezer, D., Cantwell, M., Kaye, W., and DeKosky, S.T. Reduced binding of [¹⁸F] altanserin to serotonin type 2A receptors in aging: Persistence of effect after partial volume correction. *Brain Research* 813:167-171, 1998.
- Chandra, V., Ganguli, M., Ratcliff, G., Pandav, R., Sharma, S., Belle, S., Ryan, C., Baker, C., DeKosky, S., and Nath, L. Practical issues in cognitive screening of elderly illiterate populations in developing countries: The Indo-US Cross National Dementia Epidemiology Study. *Aging (Milano)* 10:349-357, 1998.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- Lopez, O.L., Lopez-Pousa, S., Kamboh, M.I., Adroer, R., Oliva, R., Becker, J.T., and DeKosky, S.T. Apolipoprotein E polymorphism in Alzheimer's disease: A comparative study of two research populations from Spain and the United States. *European Neurology* 39:229-233, 1998.
- Forbes, M.L., Clark, R.S.B., Dixon, C.E., Graham, S.H., Marion, D.W., DeKosky, S.T., Schidling, J.K., Safar, P., and Kochanek, P.M. Augmented neuronal death in CA3 hippocampus following hyperventilation early after controlled cortical impact. *Journal of Neurosurgery* 88:549-556, 1998.
- Meltzer, C.C., Price, J.C., Mathis, C.A., Greer, P.J., Cantwell, M.N., Houck, P.R., Mulsant, B.H., Bel-Eliezer, D., Lopresti, B., DeKosky, S.T., and Reynolds, C.F. PET imaging of serotonin type 2A receptors in late-life neuropsychiatric disorders. *Am J Psychiatry* 156:1871-1878, 1999.
- Lueddecking, E.K., Ganguli, M., DeKosky, S.T., and Kamboh, M.I. Genetic polymorphism in the persyn (γ -synuclein) gene and the risk of Alzheimer's disease. *Neuroscience Letters* 261:186-188, 1999.
- Dixon, C.E., Kochanek, P.M., Yan, H.Q., Schidling, J.K., Griffith, R.G., Baum, E., Marion, D.W., and DeKosky, S.T. A one-year study of spatial memory performance, brain morphology, and cholinergic markers after moderate controlled cortical impact in rats. *Journal of Neurotrauma* 16:109-122, 1999.
- Chen, P., Ganguli, M., Mulsant, B.H., and DeKosky, S.T. The temporal relationship between depressive symptoms and dementia. *Archives of General Psychiatry* 56:261-266, 1999.
- Kamboh, M.I., Aston, C.E., Perez-Tur, J., Kokmen, E., Ferrell, R.E., Hardy, J., and DeKosky, S.T. A novel mutation in the apolipoprotein E gene (APOE*4 Pittsburgh) is associated with the risk of late-onset Alzheimer's disease. *Neuroscience Letters* 263:129-132, 1999.
- Reynolds, M.D., Johnston, J.M., Dodge, H.H., DeKosky, S.T., and Ganguli, M. Small head size is related to low Mini-Mental State Examination scores in a community sample of nondemented older adults. *Neurology* 53:228-229, 1999.
- Shao, L., Ciallella, J.R., Yan, H.Q., Ma, X., Wolfson, B.M., Marion, D.W., DeKosky, S.T., and Dixon, C.E. Differential effects of traumatic brain injury on vesicular acetylcholine transporter and M_2 muscarinic receptor mRNA and protein in rat. *Journal of Neurotrauma* 16:555-566, 1999.
- Goins, W.F., Lee, K.A., Cavalcoli, J.D., O'Malley, M.E., DeKosky, S.T., Fink, D., and Glorioso, J.C. Herpes simplex virus type 1 vector-mediated expression of nerve growth factor protects dorsal root ganglia neurons from peroxide toxicity. *Journal of Virology* 73:519-532, 1999.
- Lopez, O.L., Wisniewski, S.R., Becker, J.T., Boller, F., and DeKosky, S.T. Psychiatric medication and abnormal behavior as predictors of progression in probable Alzheimer's disease. *Archives of Neurology* 56:1266-1272, 1999.
- Sinz, E.H., Kochanek, P.M., Dixon, C.E., Clark, R.S.B., Carcillo, J.A., Schidling, J.K., Chen, M., Wisniewski, S.R., Carlos, T.M., Williams, D., DeKosky, S.T., Watkins, S.C., Marion, D.W., and Billiar, T.R. Inducible nitric oxide synthase is an endogenous neuroprotectant after traumatic brain injury in rats and mice. *J. Clin. Invest.* 104:647-656, 1999.
- Lopez, O.L., Litvan, I., Catt, K.E., Stowe, R., Klunk, W., Kaufer, D.I., Becker, J.T., and DeKosky, S.T. Accuracy of four clinical diagnostic criteria for the diagnosis of neurodegenerative dementias. *Neurology* 53:1292-1299, 1999.
- Meltzer, C.C., Price, J.C., Mathis, C.A., Greer, P.J., Cantwell, M.N., Houck, P.R., Mulsant, B.H., Ben-Eliezer, D., Lopresti, B., DeKosky, S.T., and Reynolds, C.F. PET imaging of serotonin type 2A receptors in late-life neuropsychiatric disorders. *American Journal of Psychiatry* 156:1871-1878, 1999.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- Whalen, M.J., Carlos, T.M., Kochanek, P.M., Clark, R.S.B., Heineman, S., Schiding, J.K., Francioli, D., Memarzadeh, F., Lo, W., Marion, D.W., and DeKosky, S.T. Neutrophils do not mediate blood-brain barrier permeability early after controlled cortical impact in rats. *Journal of Neurotrauma* 16:583-594, 1999.
- DeKosky, S.T. Frontotemporal dementia begins to yield its secrets. *Neurology Network Commentary* 3:253-260, 1999.
- Ganguli, M., Dodge, H.H., Chen, J., Belle, S., and DeKosky, S.T. Ten-year incidence of dementia in a rural elderly U.S. community population: The MoVIES Project. *Neurology* 54:1109-1116, 2000.
- Whalen, M.J., Carlos, T.M., Kochanek, P.M., Wisniewski, S.R., Bell, M.J., Clark, R.S.B., DeKosky, S.T., Marion, D.W., and Adelson, P.D. Interleukin-8 is increased in cerebrospinal fluid of children with severe head injury. *Critical Care Medicine* 28:929-934, 2000.
- Ganguli, M., Chandra, V., Kamboh, M.I., Johnston, J.M., Dodge, H.H., Thelma, B.K., Juyal, R.C., Pandav, R., Belle, S.H., and DeKosky, S.T. APOE polymorphism and Alzheimer disease: The Indo-US National Dementia Study. *Archives of Neurology*, 57:824-830, 2000.
- Lueddecking, E.K., DeKosky, S.T., Mehdi, H., Ganguli, M., and Kamboh, M.I. Analysis of genetic polymorphisms in the transforming growth factor- β 1 gene and the risk of Alzheimer's disease. *Human Genetics* 106:565-569, 2000.
- Bhakat, T.J., DeKosky, S.T., Ganguli, M., and Kamboh, M.I. Genetic polymorphisms in the cathepsin D and interleukin-6 genes and the risk of Alzheimer's disease. *Neuroscience Letters* 288:21-24, 2000.
- Lopez, O.L., Hamilton, R.L., Becker, J.T., Wisniewski, S., Kaufer, D.I., and DeKosky, S.T. Severity of cognitive impairment and the clinical diagnosis of AD with Lewy bodies. *Neurology* 54:1780-1787, 2000.
- Lopez, O.L., Wisniewski, S., Hamilton, R.L., Becker, J.T., Kaufer, D.I., and DeKosky, S.T. Predictors of progression in patients with AD and Lewy bodies. *Neurology* 54:1774-1779, 2000.
- Minster, R.L., DeKosky, S.T., Ganguli, M., Belle, S., and Kamboh, M.I. Genetic association studies of interleukin-1 (IL-1A and IL-1B) and interleukin-1 receptor antagonist genes and the risk of Alzheimer's disease. *Annals of Neurology* 48:817-818, 2000.
- Chen, P., Ratcliff, G., Belle, S.H., Cauley, J.A., DeKosky, S.T., and Ganguli, M. Cognitive tests that best discriminate between presymptomatic AD and those who remain non-demented. *Neurology* 55:1847-1853, 2000.
- Lopez, O.L., Becker, J.T., Klunk W., Saxton, J., Hamilton, R.L., Kaufer, D.I., Sweet, R.A., Meltzer, C.C., Wisniewski, S., Kamboh, M.I., and DeKosky, S.T. Research evaluation and diagnosis of probable Alzheimer's disease over the last two decades: I. *Neurology* 55:1854-1862, 2000.
- Lopez, O.L., Becker, J.T., Klunk W., Saxton, J., Hamilton, R.L., Kaufer, D.I., Sweet, R.A., Meltzer, C.C., Wisniewski, S., Kamboh, M.I., and DeKosky, S.T. Research evaluation and diagnosis of possible Alzheimer's disease over the last two decades: II. *Neurology* 55:1863-1869, 2000.
- Cronin-Stubbs, D., DeKosky, S.T., Morris, J.C., and Evans, D.A. Promoting interactions with basic scientists and clinicians: The NIA Alzheimer's Disease Data Coordinating Center. *Statistics in Medicine* 19:1453-1461, 2000.
- Kaufer, D.I., Cummings, J.L., Ketchel, P., Smith, V., MacMillan, A., Shelley, T., Lopez, O.L., and DeKosky, S.T. Validation of the NPI-Q: A brief clinical form of the NP Inventory. *Journal of Neuropsychiatry and Clinical Neuroscience* 12:233-239, 2000.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- Sweet, R.A., Hamilton, R.L., Lopez, O.L., Klunk, W.E., Wisniewski, S.R., Kaufer, D.I., Healy, M.T., and DeKosky, S.T. Psychotic symptoms in Alzheimer's disease are not associated with more severe neuropathologic features. *International Psychogeriatrics* 12:547-558, 2000.
- Kordower, J.H., Chu, Y., Stebbins, G.T., DeKosky, S.T., Cochran, E.J., Bennett, D., and Mufson, E.J. Loss and atrophy of layer II entorhinal cortex neurons in elderly people with mild cognitive impairment. *Annals of Neurology* 49:202-213, 2001.
- Lopez, O.L., Smith, G., Becker, J.T., Meltzer, C.C., and DeKosky, S.T. The psychotic phenomenon in probable Alzheimer's disease: A positron emission tomography study. *Journal of Neuropsychiatry and Clinical Neurosciences* 13:50-55, 2001.
- Lopez, O.L., Zivkovic, S., Smith, G., Becker, J.T., Meltzer, C.C., and DeKosky, S.T. Psychiatric symptoms associated with cortical-subcortical dysfunction in Alzheimer's disease. *Journal of Neuropsychiatry and Clinical Neurosciences* 13:56-60, 2001.
- Wang, X., Luedeking, E.L., Minster, R.L., Ganguli, M., DeKosky, S.T., and Kamboh, M.I. Lack of association between α 2-macroglobulin polymorphisms and Alzheimer's disease. *Human Genetics*, 108:105-108, 2001.
- Meltzer, C.C., Drevets, W.C., Price, J.C., Mathis, C.A., Lopresti, B., Greer, P.J., Villemagne, V., Hold, D., Mason, N.S., Houck, P.R., Reynolds, C.F., and DeKosky, S.T. Gender-specific aging effects on the serotonin 1A receptor. *Brain Research* 895:9-17, 2001.
- Nebes, R.D., Vora, I.J., Meltzer, C.C., Fukui, M.B., Williams, R.L., Kamboh, M.I., Saxton, J., Houck, P.R., DeKosky, S.T., and Reynolds, C.F. The relationship of deep white matter hyperintensities and apolipoprotein E genotype to depressive symptoms in older adult without clinical depression. *Am J of Psychiatry* 158:878-884, 2001.
- Sweet, R.A., Hamilton, R.L., Healy, M.T., Wisniewski, S.R., Henteleff, R., Pollock, B.G., Lewis, D.A., and DeKosky, S.T. Alterations of striatal dopamine receptor binding in Alzheimer's disease are associated with Lewy body pathology and with antemortem psychosis. *Archives of Neurology*, 58:466-472, 2001.
- Petersen, R.C., Stevens, J.C., Ganguli, M., Tangalos, E.G., Cummings, J.L., and DeKosky, S.T. Practice parameter: Early detection of dementia: Mild cognitive impairment (an evidence-based review). Report of the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology* 56:1133-1142, 2001.
- Knopman, D.S., DeKosky, S.T., Cummings, J.L., Chui, H., Corey-Bloom, J., Relkin, N., Small, G.W., Miller, B., and Stevens, J.C. Practice parameter: Diagnosis of dementia (an evidence-based review). Report of the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology* 56:1143-1153, 2001.
- Doody, R.S., Stevens, J.C., Beck, C., Dubinsky, R.M., Kaye, J.A., Gwyther, L., Mohs, R.C., Thal, L.J., Whitehouse, P.J., DeKosky, S.T., and Cummings, J.C. Practice parameter: Management of dementia (an evidence-based review). Report of the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology* 56:1154-1166, 2001.
- Amick, J.E., Yandora, K.A., Bell, M.J., Wisniewski, S.R., Adelson, P.D., Carcillo, J.A., Janesko, K.L., DeKosky, S.T., Carlos, T.M., Clark, R.S.B., and Kochanek, P.M. The Th1 versus Th2 cytokine profile in cerebrospinal fluid after severe traumatic brain injury in infants and children. *Pediatric Critical Care Medicine* 2:260-264, 2001.
- Bhojak, T.J., DeKosky, S.T., Ganguli, M., and Kamboh, M.I. Genetic polymorphism in the cathepsin G gene and the risk of Alzheimer's disease. *Neuroscience Letters* 309:138-140, 2001.
- DeKosky, S.T. and Orgogozo, J.-M. Alzheimer's disease: Diagnosis, costs, and dimensions of treatment. *Alzheimer Disease and Association Disorders* 15, Supplement 1, S3-S7, 2001.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- Chen, P., Ratcliff, G., Belle, S.H., Cauley, J.A., DeKosky, S.T., and Ganguli, M. Patterns of cognitive decline in presymptomatic Alzheimer disease: A prospective community study. *Archives of General Psychiatry* 58:853-858, 2001.
- Chandra, V., Pandav, R., Dodge, H.H., Johnston, J.M., Belle, S.H., DeKosky, S.T., and Ganguli, M. Incidence of Alzheimer's disease in a rural community in India: The Indo-US Study. *Neurology* 57:985-989, 2001.
- Sukonick, D.L., Pollock, B.G., Sweet, R.A., Mulsant, B.H., Rosen, J., Klunk, W.E., Kastango, K.B., DeKosky, S.T., and Ferrell, R.E. The 5-HTTPR*^S/*^L polymorphism and aggressive behavior in Alzheimer's disease. *Archives of Neurology* 58:1425-1428, 2001.
- Burmeister, L.A., Ganguli, M., Dodge, H.H., Toczek, T., DeKosky, S.T., and Nebes, R.D. Hypothyroidism and cognition: Preliminary evidence for a specific defect in memory. *Thyroid* 11:1177-1185, 2001.
- Sweet, R.A., Pollock, B.G., Sukonick, D.L., Mulsant, B.H., Rosen, J., Klunk, W.E., Kastango, K.B., DeKosky, S.T., and Ferrell, R.E. The 5-HTTPR polymorphism confers liability to a combined phenotype of psychotic and aggressive behavior in Alzheimer's disease. *International Psychogeriatrics* 13:401-409, 2001.
- Sweet, R.A., Panchalingam, K., Pettegrew, J.W., McClure, R.J., Hamilton, R.L., Lopez, O.L., Kaufer, D.I., DeKosky, S.T., and Klunk, W.E. Psychosis in Alzheimer's disease: Postmortem magnetic resonance spectroscopy evidence of excess neuronal and membrane phospholipid pathology. *Neurobiology of Aging* 23:547-553, 2002.
- Nebes, R.D., Reynolds, C.F., Boada, F., Meltzer, C.C., Fukui, M.B., Saxton, J., Halligan, E.D., and DeKosky, S.T. Longitudinal increase in the volume of white matter hyperintensities in late-onset depression. *International J of Geriatric Psychiatry* 17:526-530, 2002.
- Aizenstein, H.J., Nebes, R.D., Meltzer, C.C., Fukui, M.B., Williams, R.L., Saxton, J., Houck, P.R., Carter, C.S., Reynolds, C.F., and DeKosky, S.T. The relation of white matter hyperintensities to implicit learning in healthy older adults. *International Journal of Geriatric Psychiatry* 17:664-669, 2002.
- Desai, P., DeKosky, S.T., and Kamboh, M.I. Genetic variation in the cholesterol 24-hydroxylase (CYP46) gene and the risk of Alzheimer's disease. *NeuroScience Letters* 328:9-12, 2002.
- Lopez, O.L., Becker, J.T., Kaufer, D.I., Hamilton, R.L., Sweet, R.A., Klunk, W., and DeKosky, S.T. Research evaluation and prospective diagnosis of dementia with Lewy bodies. *Archives of Neurology* 59:43-46, 2002.
- DeKosky, S.T., Ikonomovic, M.D., Styren, S.D., Beckett, L., Wisniewski, S., Bennett, D., Kordower, J.H., and Mufson, E.J. Upregulation of choline acetyltransferase activity in hippocampus and frontal cortex of elderly subjects with mild cognitive impairment. *Annals of Neurology* 51:145-155, 2002.
- Sweet, R.A., Nimagaonkar, V.L., Devlin, B., Lopez, O.L., and DeKosky, S.T. Increased familial risk of the psychotic phenotype of Alzheimer disease. *Neurology* 58:907-911, 2002.
- Lopez, O.L., Becker, J.T., Wisniewski, S., Saxton, J., Kaufer, D.I., and DeKosky, S.T. Cholinesterase inhibitor treatment alters the natural history of Alzheimer's disease. *Journal of Neurology, Neurosurgery and Psychiatry* 72:310-314, 2002.
- Wang, X., DeKosky, S.T., Luedeking-Zimmer, E., Ganguli, M., and Kamboh, M.I. Genetic variation in alpha 1-antichymotrypsin and its association with Alzheimer's disease. *Human Genetics* 110:356-365, 2002.
- Whyte, E.M., Mulsant B.H., Butters, M.A., Qayyum, M., Towers, A., Sweet, R.A., Klunk, W., Wisniewski, S., and DeKosky, S.T. Cognitive and behavioral correlates of low vitamin B12 levels in elderly patients with progressive dementia. *American Journal for Geriatric Psychiatry* 10:321-327, 2002.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- Sweet, R.A., Kamboh, M.I., Wisniewski, S.R., Lopez, O.L., Klunk, W.E., Kaufer, D.I., and DeKosky, S.T. Apolipoprotein E and alpha-1-antichymotrypsin genotypes do not predict time to psychosis in Alzheimer's disease. *Journal of Geriatric Psychiatry and Neurology* 15:24-30, 2002.
- Bacanu, S.-A., Devlin, B., Chowdari, K.V., DeKosky, S.T., Nimgaonkar, V.L., and Sweet, R.A. Linkage analysis of Alzheimer disease with psychosis. *Neurology* 59:118-120, 2002.
- Wang, X., DeKosky, S.T., Ikonomovic, M.D., and Kamboh, M.I. Distribution of plasma alpha 1-antichymotrypsin levels in Alzheimer disease patients and controls and their genetic controls. *Neurobiology of Aging* 23:377-382, 2002.
- Lyketsos, C.G., Lopez, O., Jones, B., Fitzpatrick, A.L., Breitner, J., and DeKosky, S. Prevalence of neuropsychiatric symptoms in dementia and mild cognitive impairment. *JAMA* 288:1475-1483, 2002.
- Lueddecking-Zimmer, E., DeKosky, S.T., Chen, Q., Barmada, M.M., and Kamboh, M.I. Investigation of oxidized LDL-receptor 1 (OLR1) as the candidate gene for Alzheimer's disease on chromosome 12. *Human Genetics* 111:443-451, 2002.
- Cook, S.E., Nebes, R.D., Halligan, E.M., Burmeister, L.A., Saxton, J.A., Ganguli, M., Fukui, M.B., Meltzer, C.C., Williams, R.L., and DeKosky, S.T. Memory impairment in elderly individuals with a mildly elevated serum TSH: The role of processing resources, depression and cerebrovascular disease. *Aging, Neuropsychology and Cognition* 9:175-183, 2002.
- McFarland, C., Sweet, R.A., DeKosky, S.T., Houck, P.R., Mulsant, B.H., Pollock, B.G., and Reynolds, C.F. The establishment of a brain bank for the study of late-life depression: A feasibility study of factors facilitating consent. *CNS Spectrums* 7:816-821, 2002.
- Basu, A., Kraday, J.K., O'Malley, M., Styren, S.D., DeKosky, S.T., and Levison, S.W. The type 1 interleukin-1 receptor is essential for the microglial response to brain injury and the expression of specific pro-inflammatory mediators. *Journal of Neuroscience* 22:6071-6082, 2002.
- Ciallella, J.R., Ikonomovic, M.D., Paljug, W.R., Wilbur, Y.I., Dixon, C.E., Kochanek, P.M., Marion, D.W., and DeKosky, S.T. Changes in expression of amyloid precursor protein and interleukin-1 β after experimental traumatic brain injury in rats. *Journal of Neurotrauma* 19:1555-1567, 2002.
- Grundman, M., Sencakova, D., Jack, C.R., Petersen, R.C., Kim, H.T., Schultz, A., Weiner, M.F., DeCarli, C., DeKosky, S.T., van Dyck, C., Thomas, R.G. and Thal, L.J. for the Alzheimer's Disease Cooperative Study. Brain MRI hippocampal volume and prediction of clinical status in a mild cognitive impairment trial. *Journal of Molecular Neuroscience* 19:23-27, 2002.
- Lopez, O.L., Becker, J.T., Sweet, R.A., Klunk, W., Kaufer, D.I., Saxton, J. and DeKosky, S.T. Patterns of change in the treatment of psychiatric symptoms in patients with probable Alzheimer's disease from 1983 to 2000. *Journal of Neuropsychiatry and Clinical Neurosciences* 15:67-73, 2003.
- Desai, P.P., Hendrie, H.C., Evans, R.M., Murrell, J.R., DeKosky, S.T., and Kamboh, M.I. Genetic variation in apolipoprotein D affects the risk of Alzheimer's disease in African-Americans. *American Journal of Medical Genetics Part B (Neuropsychiatric Genetics)* 116B:98-101, 2003.
- Grundman, M., Jack, C.R., Petersen, R.C., Kim, H.T., Taylor, C., Datvian, M., Weiner, M.F., DeCarli, C., DeKosky, S.T., van Dyck, C., Darvesh, S., Yaffe, K., Kaye, J., Ferris, S.H., Thomas, R.G. and Thal, L.J. for the Alzheimer's Disease Cooperative Study. Hippocampal volume is associated with memory but not nonmemory cognitive performance in patients with mild cognitive impairment. *Journal of Molecular Neuroscience* 20:241-248, 2003.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- DeKosky, S.T., Ikonomovic, M.D., Wang, X., Farlow, M., Wisniewski, S., Lopez, O.L., Becker, J.T., Saxton, J., Klunk, W.E., Sweet, R., Kaufer, D.I., and Kamboh, M.I. Plasma and cerebrospinal fluid alpha-1-antichymotrypsin levels in Alzheimer's disease: Correlation with cognitive impairment. *Annals of Neurology* 53:81-90, 2003.
- Luedeking-Zimmer, E., DeKosky, S.T., Nebes, R., and Kamboh, M.I. Association of the 3'UTR transcription factor LBP-1c/CP2/LSF polymorphism with late-onset Alzheimer's disease. *American Journal of Medical Genetics* 117B:114-117, 2003.
- Klunk, W.E., Wang, Y., Huang, G., Debnath, M.L., Holt, D.P., Shao, L., Hamilton, R.L., Ikonomovic, M.D., DeKosky, S.T., and Mathis, C.A. The binding of 2-(4'methylaminophenyl) benzothiazole to postmortem brain homogenates is dominated by the amyloid component. *The Journal of Neuroscience* 23:2086-2092, 2003.
- O'Brien, J.T., Erkinjuntti, T., Reisberg, B., Roman, G., Sawada, T., Pantoni, L., Bowler, J.V., Ballard, C., DeCarli, C., Gorelick, P.B., Rockwood, K., Burns, A., Gauthier, S., and DeKosky, S.T. Vascular cognitive impairment. *Lancet Neurology* 2:89-98, 2003.
- DeKosky, S.T. Similar enzymes, different mechanisms. COX-1 and COX-2 enzymes in neurologic disease. *Archives of Neurology* 60:632-633, 2003.
- DeKosky, S.T. Pathology and pathways of Alzheimer's disease with an update on new developments in treatment. *Journal of the American Geriatrics Society* 51:S314-S320, 2003.
- Lopez, O.L., Becker, J.T., Sweet, R.A., Klunk, W., Kaufer, D.I., Saxton, J., Habeych, M., and DeKosky, S.T. Psychiatric symptoms vary with the severity of dementia in probable Alzheimer's disease. *The Journal of Neuropsychiatry and Clinical Neurosciences* 15:346-353, 2003.
- Ikonomovic, M.D., Mufson, E.J., Wuu, J., Cochran, E.J., Bennett, D.A., and DeKosky, S.T. Cholinergic plasticity in hippocampus of individuals with mild cognitive impairment: Correlation with Alzheimer's neuropathology. *Journal of Alzheimer's Disease* 5:39-48, 2003.
- Cook, S.E., Miyahara, S., Bacanu, S.-A., Perez-Madrinan, G., Lopez, O.L., Kaufer, D.I., Nimgaonkar, V.L., Wisniewski, S.R., DeKosky, S.T., and Sweet, R.A. Psychotic symptoms in Alzheimer disease: Evidence for subtypes. *American Journal of Geriatric Psychiatry* 11:406-413, 2003.
- DeKosky, S. Early intervention is key to successful management of Alzheimer disease. *Alzheimer Disease and Associated Disorders* 17:S99-S104, 2003.
- Pandav, R., Dodge, H.H., DeKosky, S.T., and Ganguli, M. Blood pressure and cognitive impairment in India and the United States: A cross-national epidemiological study. *Archives of Neurology* 60:1123-1128, 2003.
- Mufson, E.J., Ikonomovic, M.D., Styren, S.D., Counts, S.E., Wuu, J., Leurgans, S., Bennett, D.A., Cochran, E.J., and DeKosky, S.T. Preservation of brain nerve growth factor in mild cognitive impairment and Alzheimer disease. *Archives of Neurology* 60:1143-1148, 2003.
- Lopez, O.L. and DeKosky, S.T. Neuropathology of Alzheimer's disease and mild cognitive impairment. *Rev Neurol* 37:155-163, 2003.
- Kerr, M.E., Kamboh, M.I., Yookyoung, K., Kraus, M.F., Puccio, A.M., DeKosky, S.T., and Marion, D.W. Relationship between apoE4 allele and excitatory amino acid levels after traumatic brain injury: A preliminary report. *Critical Care Medicine* 31:2371-2379, 2003.
- Lopez, O.L., Jagust, W.J., DeKosky, S.T., Becker, J.T., Fitzpatrick, A., Dulberg, C., Breitner, J., Lyketsos, C., Jones, B., Kawas, C., Carlson, M., and Kuller, L.H. Prevalence and classification of mild cognitive impairment in the Cardiovascular Health Study Cognition Study: Part 1. *Archives of Neurology* 60:1385-1393, 2003.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Lopez, O.L., Jagust, W.J., Dulberg, C., Becker, J.T., DeKosky, S.T., Fitzpatrick, A., Breitner, J., Lyketsos, C., Jones, B., Kawas, C., Carlson, M., and Kuller, L.H. Risk factors for mild cognitive impairment in the Cardiovascular Health Study Cognition Study: Part 2. *Archives of Neurology* 60:1394-1399, 2003.

Koldamova, R.P., Lefterov, I.M., Ikonomovic, M.D., Skoko, J., Lefterov, P.I., Isanski, B.A., DeKosky, S.T., and Lazo, J.S. 22R-Hydroxycholesterol and 9-cis-retinoic acid induce ABCA1 transporter expression and cholesterol efflux in brain cells and decrease Ab secretion. *Journal of Biological Chemistry* 278(15):13244-13256, 2003.

DeKosky, S.T. and Marek, K. Looking backward to move forward: Early detection of neurodegenerative disorders. *Science* 302:830-834, 2003.

Bohnen, N.I., Kaufer, D.I., Ivanco, L.S., Lopresti, B., Koeppe, R.A., Davis, J.G., Mathis, C.A., Moore, R.Y., and DeKosky, S.T. Cortical cholinergic function is more severely affected in Parkinsonian dementia than in Alzheimer's disease: An *in vivo* positron emission tomographic study. *Archives of Neurology* 60:1745-1748, 2003.

Butters, M.A., Sweet, R.A., Mulsant, B.H., Kamboh, M.I., Pollock, B.G., Begley, A.E., Reynolds, C.F., and DeKosky, S.T. APOE is associated with age-of-onset, but not cognitive functioning, in late-life depression. *International Journal for Geriatric Psychiatry* 18:1075-1081, 2003.

Dodge, H.H., Shen, C., Pandav, R., DeKosky, S.T., and Ganguli, M. Functional transitions and active life expectancy associated with Alzheimer's disease. *Archives of Neurology* 60:253-259, 2003.

Mufson, E.J., Ginsberg, S.D., Ikonomovic, M.D., and DeKosky, S.T. Human cholinergic basal forebrain: Chemoanatomy and neurologic dysfunction. *Journal of Chemical Neuroanatomy* 26:233-242, 2003.

Hope, C., Mettenburg, J., Gonias, S.L., DeKosky, ST., Kamboh, M.I., and Chu, C.T. Functional analysis of plasma alpha-2-macroglobulin from Alzheimer's disease patients with the A2M intronic deletion." *Neurobiology of Disease* 14:504-512, 2003.

DeKosky, S.T. How should we design studies for stroke prevention? *Archives of Neurology* 60:778-779, 2003.

Lambert, J.-C., Lueddecking-Zimmer, E., Merrot, S., Hayes, A., Thaker, U., Desai, P., Houzet, A., Hermant, X., Cottel, D., Pritchard, A., Iwatsubo, T., Pasquier, F., Frigard, B., Conneally, P.M., Chartier-Harlin, M.-C., DeKosky, S.T., Lendon, C., Mann, D., Kamboh, M.I., and Amouyel, P. Association of 3'-UTR polymorphisms of the oxidized LDL-receptor 1 (OLR1) gene with Alzheimer's disease. *Journal of Medical Genetics* 40:424-430, 2003.

DeKosky, S.T., Taffe, K.M., Abrahamson, E.A., Dixon, C.E., Kochanek, P.M., and Ikonomovic, M.D. Time course analysis of hippocampal nerve growth factor and antioxidant enzyme activity following lateral controlled cortical impact brain injury in the rat. *Journal of Neurotrauma* 21:491-500, 2004.

DeKosky, S.T., Farlow, M., and Ikonomovic, M.D. Increased levels of plasma alpha 1-antichymotrypsin mark Alzheimer's disease progression. *Research and Practice in Alzheimer's Disease* 9:83-88, 2004.

Ganguli, M., Dodge, H.H., Shen, C., and DeKosky, S.T. Mild cognitive impairment, amnestic type: An epidemiologic study. *Neurology* 63:115-121, 2004.

Pandav, R.S., Chandra, V., Dodge, H.H., DeKosky, S.T., and Ganguli, M. Hemoglobin levels and Alzheimer disease: An epidemiologic study in India. *American Journal of Geriatric Psychiatry* 12:523-526, 2004.

Perez-Madriñan, G., Cook, S.E., Saxton, J.A., Miyahara, S., Lopez, O.L., Kaufer, D.I., Aizenstein, H.J., DeKosky, S.T., and Sweet, R.A. Alzheimer disease with psychosis: Excess cognitive impairment is restricted to the misidentification subtype. *American Journal of Geriatric Psychiatry* 12:449-456, 2004.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- Marshall, G.A., Kaufer, D.I., Lopez, O.L., Rao, G.R., Hamilton, R.L., and DeKosky, S.T. Right prosubiculum amyloid plaque density correlates with anosognosia in Alzheimer's disease. *J Neurol Neurosurg Psychiatry* 75: 1396-1400, 2004.
- Ganguli, M., Rodriguez, E., Mulsant, B., Richards, S., Pandav, R., VanderBilt, J., Dodge, H.H., Stoehr, G.P., Saxton, J., Morycz, R.K., Rubin, R.T., Farkas, B., and DeKosky, S.T. Detection and management of cognitive impairment in primary care: The Steel Valley Seniors Survey. *Journal of the American Geriatrics Society* 52:1668-1675, 2004.
- DeKosky, S.T. and Ikonomovic, M.D. NIFID: A new molecular pathology with a frontotemporal dementia phenotype. *Neurology* 63:1348-1349, 2004.
- Ikonomovic, M.D., Uryu, K., Abrahamson, E.E., Ciallella, J.R., Trojanowski, J.Q., Lee, V. M.-Y., Clark, R.S., Marion, D.W., Wisniewski, S.R., and DeKosky, S.T. Alzheimer's pathology in human temporal cortex surgically excised after severe brain injury. *Experimental Neurology* 190:192-203, 2004.
- DeKosky, S.T., Abrahamson, E.E., Taffe, K.M., Dixon, C.E., Kochanek, P.M., and Ikonomovic, M.D. Effects of post-injury hypothermia and nerve growth factor infusion on antioxidant enzyme activity in the rat: Implications for clinical therapies. *Journal of Neurochemistry* 90:998-1004, 2004.
- Sweet, R.A., Hamilton, R.L., Butters, M.A., Mulsant, B.H., Pollock, B.G., Lewis, D.A., Lopez, O.L., DeKosky, S.T., and Reynolds, C.F. Neuropathologic correlates of late-onset major depression. *Neuropsychopharmacology* 29:2242-2250, 2004.
- Bohnen, N., Kaufer, D., Hendrickson, R., Ivanco, L., Moore, R., and DeKosky, S. Effects of donepezil on motor function in patients with Alzheimer's disease. *J Clin Psychopharmacology* 24:354-356, 2004.
- Ishikawa, M., Mizukami, K., Iwakiri, M., Kamma, H., Ikonomovic, M.D., DeKosky, S.T. and Asada, T. Immunohistochemical study of hnRNP B1 in the postmortem temporal cortices of patients with Alzheimer's disease. *Neuroscience Research* 50:481-484, 2004.
- Lopez, O.L., Becker, J.T., Saxton, S., Sweet, R.A., Klunk, W., and DeKosky, S.T. Alteration of a clinically meaningful outcome in the natural history of Alzheimer's disease by cholinesterase inhibition. *Journal of the American Geriatrics Society* 53:83-87, 2005.
- Ikonomovic, M.D., Mufson, E.J., Wuu, J., Bennett, D.A., and DeKosky, S.T. Reduction of choline acetyltransferase activity in primary visual cortex in mild to moderate Alzheimer's disease. *Archives of Neurology* 62:425-430, 2005.
- Kuller, L.H., Lopez, O.L., Jagust, W.J., Becker, J.T., DeKosky, S.T., Lyketsos, C., Breitner, J.C.S., Fitzpatrick, A., and Dulberg, C. Determinants of vascular dementia in the Cardiovascular Health Cognition Study. *Neurology*, 64:1548-1552, 2005.
- Lopez, O.L., Kuller, L.H., Becker, J.T., Jagust, W.J., DeKosky, S.T., Fitzpatrick, A., Breitner, J., Lyketsos, C., Kawas, C., and Carlson, M. Classification of vascular dementia in the Cardiovascular Health Study Cognition Study. *Neurology* 64:1539-1547, 2005.
- Ganguli, M., Dodge, H.H., Shen, C., Pandav, R.S., and DeKosky, S.T. Alzheimer's disease and mortality: A 15-year epidemiologic study. *Archives of Neurology* 62:779-784, 2005.
- Ozturk, A., Desai, P.P., Minster, R.L., DeKosky, S.T., and Kamboh, M.I. Three SNPs in the GSTO1, GSTO2 and PRSS11 genes on chromosome 10 are not associated with age-at-onset of Alzheimer's disease. *Neurobiology of Aging* 26:1161-1165, 2005.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- Fleisher, A., Grundman, M., Jack, C.R., Petersen, R.C., Taylor, C., Kim, H.T., Schiller, D.H.B., Bagwell, V., Sencakowa, D., Weiner, M.F., DeCarli, C., DeKosky, S.T., van Dyck, C., Thomas, R.G., and Thal, L.J. Sex, apolipoprotein E E4 status, and hippocampal volume in mild cognitive impairment. *Archives of Neurology* 62:953-957, 2005.
- Garand, L., Dew, M.A., Eazor, L.R., DeKosky, S.T., and Reynolds, C.F. Caregiving burden and psychiatric morbidity in spouses of persons with mild cognitive impairment. *International Journal of Geriatric Psychiatry*, 20:512-522, 2005.
- Satchell, M.A., Lai, Y., Kochanek, P.M., Wisniewski, S.R., Fink, E.L., Siedberg, N.A., Berger, R.P., DeKosky, S.T., Adelson, P.D., and Clark, R.S.B. Cytochrome c, a biomarker of apoptosis, is increased in cerebrospinal fluid from infants with inflicted brain injury from child abuse. *Journal of Cerebral Blood Flow and Metabolism* 25:919-927, 2005.
- Newman, A.B., Fitzpatrick, A.L., Lopez, O., Jackson, L., Lyketsos, C., Jagust, W., Ives, D., DeKosky, S.T., and Kuller, L.H. Dementia and Alzheimer's disease incidence in relationship to cardiovascular disease in the Cardiovascular Health Study cohort. *Journal of the American Geriatrics Society* 53:1101-1107, 2005.
- Iwakiri, M., Mizukami, K., Ikonomovic, M.D., Ishikawa, M., Hidaka, S., Abrahamson, E.E., DeKosky, S.T., and Asada, T. Changes in hippocampal GABA_BR1 subunit expression in Alzheimer's patients: Association with Braak staging. *Acta Neuropathol* 109:467-474, 2005.
- Bacanu, S.A., Devlin, B., Chowdari, K.V., DeKosky, S.T., Nimgaonkar, V.L., and Sweet, R.A. Heritability of psychosis in Alzheimer disease. *American Journal of Geriatric Psychiatry* 13:624-627, 2005.
- Bell-McGinty, S., Lopez, O.L., Meltzer, C.C., Scanlon, J.M., Whyte, E.M., DeKosky, S.T., and Becker, J.T. Differential cortical atrophy in subgroups of mild cognitive impairment. *Archives of Neurology* 62:1393-1397, 2005.
- Mathis, C.A., Klunk, W.E., Price, J.C., and DeKosky, S.T. Imaging technology for neurodegenerative diseases: Progress toward detection of specific pathologies. *Archives of Neurology* 62:196-200, 2005.
- Desai, P., Nebes, R., DeKosky, S.T., and Kamboh, M.I. Investigation of the effect of brain-derived neurotrophic factor (BDNF) polymorphisms on the risk of late-onset Alzheimer's disease (AD) and quantitative measures of AD progression. *Neuroscience Letters* 379:229-234, 2005.
- Nebes, R.D., Pollock, B.G., Meltzer, C.C., Saxton, J.A., Houck, P.R., Halligan, E.M., and DeKosky, S.T. Serum anticholinergic activity, white matter hyperintensities, and cognitive performance. *Neurology* 65:1487-1489, 2005.
- Price, J.E., Klunk, W.E., Lopresti, B., Lu, X., Hoge, J.A., Ziolk, S.K., Holt, D.P., Meltzer, C.C., DeKosky, S.T., and Mathis, C.A. Kinetic modeling of amyloid binding in humans using PET imaging and Pittsburgh Compound-B. *Journal of Cerebral Blood Flow & Metabolism* 25:1528-1547, 2005.
- Schneider, L.S., DeKosky, S.T., Farlow, M.R., Tariot, P.N., Hoerr, R., and Kieser, M. A randomized, double-blind, placebo-controlled trial of two doses of Ginkgo biloba extract in dementia of the Alzheimer's type. *Current Alzheimer Research* 2:541-551, 2005.
- Klunk, W.E., Lopresti, B.J., Ikonomovic, M.D., Lefterov, I.M., Koldamova, R.P., Abrahamson, E.E., Debnath, M.L., Holt, D.P., Huang, G-F., Shao, L., DeKosky, S.T., Price, J.C., and Mathis, C.A. Binding of the positron emission tomography tracer, Pittsburgh Compound-B, reflects the amount of amyloid- β in Alzheimer's disease brain, but not in transgenic mouse brain. *Journal of Neuroscience* 25:10598-10606, 2005.
- DeKosky, S.T. Statin therapy in the treatment of Alzheimer disease: What is the rationale? *The American Journal of Medicine* 118(12A):48S-53S, 2005.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- Bohnen, N.I., Kaufer, D.I., Hendrickson, R., Ivanco, L.S., Lopresti, B.J. Koeppen, R.A., Meltzer, C.C., Constantine, G., Davis, J.G., Mathis, C.A., DeKosky, S.T., and Moore, R.Y. Degree of inhibition of cortical acetylcholinesterase activity and cognitive effects by donepezil treatment in Alzheimer's disease. *Journal of Neurology, Neurosurgery and Psychiatry* 76:315-319, 2005.
- Lopez, O.L., Becker, J.T., Sweet, R.A., Klunk, W., Saxton, J., and DeKosky, S.T. Another data/rhetoric mismatch on donepezil. *JAGS* 53:1832-1833, 2005.
- Omalu, B.I., DeKosky, S.T., Minster, R.L., Kamboh, M.I., Hamilton, R.L., and Wecht, C.H. Chronic traumatic encephalopathy in a National Football League (NFL) player. *Neurosurgery* 57:128-134, 2005.
- Lopresti, B.J., Klunk, W.E., Mathis, C.A., Hoge, J.A., Ziolko, S.K., Lu, X., Meltzer, C.C., Schimmel, K., Tsopelas, N., DeKosky, S.T., and Price, J.C. Simplified quantification of Pittsburgh-Compound B (PIB) amyloid imaging PET studies: A comparative analysis. *Journal of Nuclear Medicine* 46:1959-1972, 2005.
- Rosano, C., Aizenstein, H.J., Cochran, J.L., Saxton, J.A., DeKosky, S.T., Newman, A.B., Kuller, L.H., Lopez, O.L., and Carter, C.S. Event-related functional magnetic resonance imaging investigation of executive control in very old individuals with mild cognitive impairment. *Biological Psychiatry* 57:761-767, 2005.
- Tsuang, D.W., Wilson, R.K., Lopez, O.L., Luedeking-Zimmer, E.K., Leverenz, J.B., DeKosky, S.T., Kamboh, M.I., and Hamilton, R.L. Genetic association between the APOE-4 allele and Lewy bodies in Alzheimer's disease. *Neurology* 64:509-513, 2005.
- Sweet, R.A., Devlin, B., Pollock, B.G., Sukonick, D.L., Kastango, K.B., Bacanu, S.-A., Chowdari, K.V., DeKosky, S.T., and Ferrell, R.E. Catechol-o-methyltransferase haplotypes are associated with psychosis in Alzheimer disease. *Molecular Psychiatry* 10:1026-1036, 2005.
- Desai PP, Ikonomovic MD, Abrahamson EE, Hamilton RL, Isanski BA, Hope CE, Klunk WE, DeKosky ST, Kamboh MI. Apolipoprotein D is a component of compact but not diffuse amyloid-beta plaques in Alzheimer's disease temporal cortex. *Neurobiology of Disease* 20:574-582, 2005.
- Rosano, C., Aizenstein, H., Cochran, J., Saxton, J., DeKosky, S., Newman, A.B., Kuller, L.H., Lopez, O.L., and Carter, C.S. Functional neuroimaging indicators of successful executive control in the oldest old. *NeuroImage* 28:881-889, 2005.
- Saxton, J., Kastango, K.B., Hugonot-Diener, L., Boller, F., Verny, M., Sarles, C.E., Girgis, R.R., Devouche, E., Mecocci, P., Pollock, B.G., and DeKosky, S.T. Development of a short form of the Severe Impairment Battery (SIB). *American Journal of Geriatric Psychiatry* 13:999-1005, 2005.
- Mizukami, K., Ishikawa, M., Iwakiri, M., Ikonomovic, M.D., DeKosky, S.T., Kamma, H. and Asada, T. Immunohistochemical study of the hnRNP A2 and B1 in the hippocampal formations of brains with Alzheimer's disease. *Neuroscience Letters* 386:111-115, 2005.
- Bohnen, N.I., Kaufer, D.I., Hendrickson, R., Ivanco, L.S., Lopresti, B., Davis, J.G., Constantine, G., Mathis, C.A., Moore, R.Y. and DeKosky, S.T. Cognitive correlates of alterations in acetylcholinesterase in Alzheimer's disease. *Neuroscience Letters* 380:127-132, 2005.
- Counts, S.E., Che, S., Ikonomovic, M., Wuu, J., Ginsberg, S.D., DeKosky, S.T. and Mufson, E.J. Galanin fiber hypertrophy within the cholinergic nucleus basalis during the progression of Alzheimer's disease. *Dementia and Geriatric Cognitive Disorders* 21:205-214, 2006.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Abrahamson, E.E., Ikonomovic, M.D., Ciallella, J.R., Hope, C.E., Paljug, W.R., Isanski, B.A., Flood, D.G., Clark, R.S.B., and DeKosky, S.T. Caspase inhibition therapy abolishes brain trauma-induced increases in A β peptide: Implications for clinical outcome. *Experimental Neurology* 197:437-450, 2006.

Lopez, O.L., Becker, J.T., Jagust, W.J., Fitzpatrick, A., Carlson, M.C., DeKosky, S.T., Breitner, J., Lyketsos, C.G., Jones, B., Kawas, C., and Kuller, L.H. Neuropsychological characteristics of mild cognitive impairment subgroups. *J Neurol Neurosurg Psychiatry* 77:159-165, 2006.

Fagan, A.M., Mintun, M.A., Mach, R.H., Lee, S.-Y., Dence, C.S., Shah, A.R., LaRossa, G.N., Spinner, M.L., Klunk, W.E., Mathis, C.A., DeKosky, S.T., Morris, J.C., and Holtzman, D.M. Inverse relation between *in vivo* amyloid imaging load and cerebrospinal fluid A β_{42} in humans. *Annals of Neurology* 59:512-519, 2006.

DeKosky, S.T., Fitzpatrick, A., Ives, D.G., Saxton, J., Williamson, J., Lopez, O.L., Burke, G., Fried, L., Kuller, L.H., Robbins, J., Tracy, R., Woolard, N., Dunn, L., Kronmal, R., Nahin, R., and Furberg, C. The Ginkgo Evaluation of Memory (GEM) Study: Design and baseline data of a randomized trial of Ginkgo biloba extract in prevention of dementia. *Contemporary Clinical Trials* 27:238-253, 2006.

Nebes, R.D., Meltzer, C.C., Whyte, E.M., Scanlon, J.M., Halligan, E.M., Saxton, J.A., Houck, P.R., Boada, F.E. and DeKosky, S.T. The relation of white matter hyperintensities to cognitive performance in the normal old: Education matters. *Aging, Neuropsychology and Cognition* 13:326-340, 2006.

Mintun, M.A., LaRossa, G.N., Sheline, Y.I., Dence, C.S., Lee, S.Y., Mach, R.H., Klunk, W.E., Mathis, C.A., DeKosky, S.T., and Morris, J.C. [^{11}C] PIB in a nondemented population: Potential antecedent marker of Alzheimer disease. *Neurology* 67:446-452, 2006.

McConnell, S., Karlawish, J., Vellas, B., and DeKosky, S. Perspectives on assessing benefits and risks in clinical trials for Alzheimer's disease. *Alzheimer's and Dementia* 2:160-163, 2006.

Minster, R.L., DeKosky, S.T., and Kamboh, M.I. Lack of association of two chromosome 10q24 SNPs with Alzheimer's disease. *Neuroscience Letters* 402:170-172, 2006.

Wilkosz, P.A., Miyahara, S., Lopez, O.L., DeKosky, S.T., and Sweet, R.A. Prediction of psychosis onset in Alzheimer disease: The role of cognitive impairment, depressive symptoms, and further evidence for psychosis subtypes. *American Journal of Geriatric Psychiatry* 14:352-360, 2006.

Bohnen, N.I., Kaufer, D.I., Hendrickson, R., Ivanco, L.S., Lopresti, B.J., Davis, J.G., Constantine, G., Mathis, C.A., Moore, R.Y., and DeKosky, S.T. Cognitive correlates of alterations in acetylcholinesterase in Alzheimer's disease. *Neuroscience Letter* 380:127-132, 2006.

Bohnen, N.I., Kaufer, D.I., Hendrickson, R., Ivanco, L.S., Lopresti, B.J., Constantine, G.M., Mathis, C.A., Davis, J.G., Moore, R.Y., and DeKosky, S.T. Cognitive correlates of cortical cholinergic denervation in Parkinson's disease and parkinsonian dementia. *J Neurol* 253:242-247, 2006.

Nahin, R.L., Fitzpatrick, A.L., Williamson, J.D., Burke, G.L., DeKosky, S.T., and Furberg, C. Use of herbal medicine and other dietary supplements in community-dwelling older people: Baseline data from the Ginkgo Evaluation of Memory Study. *JAGS* 54:1725-1735, 2006.

Fitzpatrick, A.L., Fried, L.P., Williamson, J., Crowley, P., Posey, D., Kwong, L., Bonk, J., Moyer, R., Chabot, J., Kidoguchi, L., Furberg, C.D., and DeKosky, S.T. Recruitment of the elderly into a pharmacologic prevention trial: The Ginkgo Evaluation of Memory Study experience. *Contemporary Clinical Trials* 27:541-553, 2006.

DeKosky, S.T. Maintaining adherence and retention in dementia prevention trials. *Neurology* 67(Suppl. 3):S14-S16, 2006.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- Green, R.C. and DeKosky, S.T. Primary prevention trials in Alzheimer disease. *Neurology* 67(Suppl. 3):S2-S5, 2006.
- Ozturk, A., DeKosky, S.T., and Kamboh, M.I. Genetic variation in the Choline acetyltransferase (ChAT) gene may be associated with the risk of Alzheimer's disease. *Neurobiology of Aging* 27:1440-1444, 2006.
- Kamboh, M.I., Minster, R.L., Kenney, M., Ozturk, A., Desai, P.P., Kammerer, C.M., and DeKosky, S.T. Alpha-1-antichymotrypsin (ACT or SERPINA3) polymorphism may affect age-at-onset and disease duration of Alzheimer's disease. *Neurobiology of Aging* 27:1435-1439, 2006.
- Lingler, J.H., Parker, L.S., DeKosky, S.T., and Schulz, R. Caregivers as subjects of clinical drug trials: A review of human subjects protection practices in published studies of Alzheimer's disease pharmacotherapies. *IRB: Ethics & Human Research* 28:11-18, 2006.
- Ziolko S.K., Weissfeld, L.A., Klunk, W.E., Mathis, C.A., Hoge, J.A., Lopresti, B.J., DeKosky, S.T., and Price, J.C. Evaluation of voxel-based methods for the statistical analysis of PIB PET amyloid imaging studies in Alzheimer's Disease. *NeuroImage* 33:94-102, 2006.
- Klunk, W.E., Mathis, C.A., Price, J.C., Lopresti, B.J. and DeKosky, S.T.. Commentary: Two-year follow-up of amyloid deposition in patients with Alzheimer's disease. *Brain* 129:2805-2807, 2006.
- Ozturk, A., DeKosky, S.T., and Kamboh, M.I. Lack of association of 5 SNPs in the vicinity of the insulin-degrading enzyme (IDE) gene with late-onset Alzheimer's disease. *Neuroscience Letters* 406:265-269, 2006.
- Lingler, J.H., Nightingale, M.C., Erlen, J.A., Kane, A.L., Reynolds, C.F., Schulz, R., and DeKosky, S.T. Making sense of mild cognitive impairment: A qualitative exploration of the patient's experience. *Gerontologist* 46:791-800, 2006.
- Omalu, B.I., DeKosky, S.T., Hamilton, R.L., Minster, R.L., Kamboh, M.I., Shakir, A., and Wecht, C.H. Chronic traumatic encephalopathy in a national football league player: part II. *Neurosurgery* 59:1086-1092, 2006.
- Ikonomovic, M.D., Abrahamson, E.E., Isanski, B.A., Manik, M.L., Mathis, C.A., DeKosky, S.T., and Klunk, W.E. X-34 labeling of abnormal protein aggregates during the progression of Alzheimer's disease. *Methods in Enzymology* 412:123-144, 2006.
- Kagan, V.E., Tyurina, Y.Y., Bayir, H., Chu, C.T., Kapralov, A.A., Vlasova, I.I., Belikova, N.A., Tyurin, V.A., Amoscato, A., Epperly, M., Greenberger, J., DeKosky, S., Shvedova, A.A., and Jiang, J. The "pro-apoptotic genies" get out of mitochondria: oxidative lipidomics and redox activity of cytochrome c/cardiolipin complexes. *Chemico-Biological Interactions* 163:15-28, 2006.
- Kamboh, M.I., Minster, R.L., Feingold, E., and DeKosky, S.T. Genetic association of ubiquilin with Alzheimer's disease and related quantitative measures. *Molecular Psychiatry* 11:273-279, 2006.
- Zhang, X., Chen, Y., Ikonomovic, M.D., Nathaniel, P.D., Kochanek, P.M., Marion, D.W., DeKosky, S.T., Jenkins, L.W., and Clark, R.S.B. Increased phosphorylation of protein kinase B and related substrates after traumatic brain injury in humans and rats. *Journal of Cerebral Blood Flow and Metabolism* 26:915-926, 2006.
- Sundar, P.D., Feingold, E., Minster, R., DeKosky, S.T., and Kamboh, M.I. Gender-specific association of ATP-binding cassette transporter 1 (ABCA1) polymorphisms with the risk of late-onset Alzheimer's disease. *Neurobiology of Aging* 28:856-862, 2006.
- Bayir, H., Fadeel, B., Palladino, M.J., Witasp, E., Kurnikov, I.V., Tyurina, Y.Y., Tyurin, V.A., Amoscato, A.A., Jiang, J., Kochanek, P.M., DeKosky, S.T., Greenberger, J.S., Shvedova, A.A. and Kagan, V.E. Apoptotic interactions of cytochrome c: Redox flirting with anionic phospholipids within and outside of mitochondria. *Biochimica et Biophysica Acta* 1757:648-659, 2006.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Ozturk, A., Minster, R.L., DeKosky, S.T., and Kamboh, M.I. Association of tagSNPs in the urokinase-plasminogen activator (PLAU) gene with Alzheimer's disease and associated quantitative traits. *Neuropsychiatric Genetics* 144:79-82, 2007.

Lopez, O.L., Kuller, L.H., Becker, J.T., Dulberg, C., Sweet, R.A., Gach, H.M., and DeKosky, S.T. Incidence of dementia in mild cognitive impairment in the Cardiovascular Health Study Cognition Study. *Archives of Neurology* 64:416-420, 2007.

Scheff, S.W., Price, D.A., Schmitt, F.A., DeKosky, S.T., and Mufson, E. J. Synaptic alterations in CA1 in mild Alzheimer disease and mild cognitive impairment. *Neurology* 68:1501-1508, 2007.

Bayir, H., Fadeel, B., Palladino, M.J., Witas, E., Kurnikov, I.V., Tyurina, Y.Y., Tyurin, V.A., Amoscato, A.A., Jiang, J., Kochanek, P.M., DeKosky, S.T., Greenberger, J.S., Shvedova, A.A., and Kagan, V.E. Apoptotic interactions of cytochrome c: redox flirting with anionic phospholipids within and outside of mitochondria. *Biochim Biophys Acta* 1757:648-659, 2007.

DeKosky, S.T., Abrahamson, E.E., Ciallella, J.R., Paljug, W.R., Wisniewski, S.R., Clark, R.S.B., and Ikonomovic, M.D. Association of increased cortical soluble A β ₄₂ levels with diffuse plaques after severe brain injury in humans. *Archives of Neurology* 64:541-544, 2007.

McIntyre, J.A., Hamilton, R.L., and DeKosky, S.T. Redox-reactive autoantibodies in cerebrospinal fluids. *New York Academy of Sciences* 1109:296-302, 2007.

Klunk, W.E., Price, J.C., Mathis, C.A., Tsopelas, N.D., Lopresti, B.J., Ziolko, S.K., Bi, W., Hoge, J.A., Ikonomovic, M.D., Saxton, J., Snitz, B., Pollen, D.A., Moonis, M., Lippa, C.F., Swearer, J., Johnson, K.A., Rentz, D.M., Fischman, A.J., Aizenstein, H., and DeKosky, S.T. Amyloid deposition begins in the striatum of presenilin-1 mutation carriers from two unrelated pedigrees. *Journal of Neuroscience* 27:6174-6184, 2007.

Ikonomovic, M.D., Abrahamson, E.E., Isanski, B.A., Wuu, J., Mufson, E.J. and DeKosky, S.T. Superior frontal cortex cholinergic axon density in mild cognitive impairment and early Alzheimer's disease. *Archives of Neurology* 64:1312-1317, 2007.

Fitzpatrick, A.L., Buchanan, C.K., Nahin, R.L., DeKosky, S.T., Atkinson, H.H., Carlson, M.C., and Williamson, J.D. Associations of gait speed and other measures of physical function with cognition in a healthy cohort of the elderly. *Journal of Gerontology* 62A:1244-1251, 2007.

Garand, L., Dew, M.A., Urda, B., Lingler, J.H., DeKosky, S.T., and Reynolds, C.F. Marital quality in the context of mild cognitive impairment. *Western Journal of Nursing Research* 29:976-992, 2007.

Counts, S. E., He, B., Che, S., Ikonomovic, M.D., DeKosky, S.T., Ginsberg, S.D., and Mufson, E.J. Alpha 7 nicotinic receptor up-regulation in cholinergic basal forebrain neurons in Alzheimer disease. *Archives of Neurology* 64:1771-1776, 2007.

Dubois, B., Feldman, H., Jacova, C., DeKosky, S.T., Barberger-Gateau, P., Cummings, J., et al. Research criteria for the diagnosis of Alzheimer's disease: Revising the NINCDS-ADRDA criteria – A position paper. *Lancet Neurology* 6:734-746, 2007.

Wilcosz, P.A., Kodavali, C., Weamer, E.A., Miyahara, S., Lopez, O.L., Ningaonkar, V.L., DeKosky, S.T., and Sweet, R.A. Prediction of psychosis onset in Alzheimer disease: The role of depression symptom severity and the HTR2A T102C polymorphism. *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics* 144:1054-1062, 2007.

Perez, S.E., Dar, S., Ikonomovic, M.D., DeKosky, S.T., and Mufson, E.J., Cholinergic forebrain degeneration in APPswe/PS1?E9 transgenic mice. *Neurobiology of Disease* 28:3-15, 2007.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Lambert, J.-C., Ferreira, S., Gussekloo, J., Christiansen, L., Brysbaert, G., Slagboom, E., Cottel, D., Petit, T., Hauw, J.-J., DeKosky, S.T., Richard, F., Berr, C., Lendon, C., Kamboh, M.I., Mann, D., Christensen, K., Westendorp, R., and Amouyel, P. Evidence for the association of the S100 β gene with low cognitive performance and dementia in the elderly. *Molecular Psychiatry* 12:870-880, 2007.

Bacska, B.J., Frosch, M.P., Freeman, S.H., Raymond, S.B., Augustinack, J.C., Johnson, K.A., Irizarry, M.C., Klunk, W.E., Mathis, C.A., DeKosky, S.T., Greenberg, S.M., Hyman, B.T. and Growdon, J.H. Molecular imaging with Pittsburgh Compound B confirmed at autopsy: A case report. *Archives of Neurology* 64:431-434, 2007.

Sundar, P.D., Feingold, E., Minster, R.L., DeKosky, S.T. and Kamboh, M.I. Gender-specific association of ATP-binding cassette transporter 1 (ABCA1) polymorphisms with the risk of late-onset Alzheimer's disease. *Neurobiology of Aging* 28:856-862, 2007.

McIntyre, J.A., Chapman, J., Shavit, E., Hamilton, R.L. and DeKosky, S.T. Redox-reactive autoantibodies in Alzheimer's patients' cerebrospinal fluids: Preliminary studies. *Autoimmunity* 40:390-396, 2007.

Johnson, K.A., Gregas, M., Becker J.A., Kinnecom, C., Salat, D.H., Moran, E.K., Smith, E.E., Rosand, J., Rentz, D.M., Klunk, W.E., Mathis C.A., Price, J.C., DeKosky, S.T., Fischman, A.J. and Greenberg, S.M. Imaging of amyloid burden and distribution in cerebral amyloid angiopathy. *Annals of Neurology* 62:229-234, 2007.

Williamson, J.D., Vellas, B., Furberg, C., Nahin, R., and DeKosky, S.T. Comparison of the design differences between the Ginkgo Evaluation of Memory Study and the Guidage Study. *The Journal of Nutrition, Health and Aging* 12:73S-79S, 2008. PMID: 18165850

DeKosky, S.T. Taking the next steps in the diagnosis of Alzheimer's disease: The use of biomarkers. *CNS Spectrums* 13, Suppl. 3:7-10, 2008. PMID: 18564459

DeKosky, S.T. and Furberg, C.D. Editorial: Turning over a new leaf: Ginkgo biloba in prevention of dementia: *Neurology* 70:1730-1731, 2008. PMID: 18458215

Lopez, O.L., Kuller, L.H., Mehta, P.D., Becker, J.T., Gach, H.M., Sweet, R.A., Chang, Y.F., Tracy, R., and DeKosky, S.T. Plasma amyloid levels and the risk of AD in normal subjects in the Cardiovascular Health Study. *Neurology* 70:1664-1671, 2008. PMCID: 2670993

Ikonomovic, M.D., Klunk, W.E., Abrahamson, E.E., Mathis, C.A., Price, J.C., Tsopelas, N.D., Lopresti, B.J., Ziolko, S., Bi, W., Paljug, W.R., Debnath, M.L., Hope, C.E., Isanski, B.A., Hamilton, R.L. and DeKosky, S.T. Post-mortem correlates of *in vivo* PiB-PET amyloid imaging in a typical case of Alzheimer's disease. *Brain* 131:1630-1645, 2008. PMCID: 2408940

Faulkner, L.R., Tivnan, P.W., Johnston, M.V., Aminoff, M.J., Coyle, P.K., Crumrine, P.K., DeKosky, S.T., Jozefowicz, R., Massey, J.M., and Pascuzzi, R.M. The ABPN maintenance of certification program for neurologists: Past, present, and future. *Neurology* 71:599-604, 2008. PMID: 18596242

Minster, R.L., DeKosky, S.T. and Kamboh, M.I. No association of dynamin binding protein (DNMBP) gene SNPs and Alzheimer's disease. *Neurobiology of Aging* 29:1602-1604, 2008. PMCID: 2553275

DeKosky, S.T., Williamson, J.D., Fitzpatrick, A., Kronmal, R.A., Ives, D.G., Saxton, J.A., Lopez, O.L., Burke, G., Carlson, M.C., Fried, L.P., Kuller, L.H., Robbins, J., Tracy, R.P., Woolard, N.F., Dunn, L., Snitz, B.E., Nahin, R.L., Furberg, C.D. for the GEM Study Investigators. Ginkgo biloba for prevention of dementia: Results of the Ginkgo Evaluation of Memory (GEM) Study. *JAMA* 300(19):2253-2262, 2008. PMCID: 2823569

Ikonomovic, M.D., Abrahamson, E.E., Uz, T., Manev, H., and Dekosky, S.T. Increased 5-Lipoxygenase immunoreactivity in the hippocampus of patients with Alzheimer's disease. *J Histochem Cytochem* 56:1065-1073, 2008. PMCID: 2583907

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- Butters, M.A., Klunk, W.E., Mathis, C.A., Price, J.C., Ziolko, S.K., Hoge, J.A., Tsopelas, N.D., Lopresti, B.J., Reynolds, C.F., DeKosky, S.T. and Meltzer, C.C. Imaging Alzheimer's pathology in late-life depression with PET and Pittsburgh Compound-B. *Alzheimer Disease and Associated Disorders* 22:261-268, 2008. PMID: 2636843
- Aizenstein, H.J., Nebes, R.D., Saxton, J.A., Price, J.C., Mathis, C.A., Tsopelas, N.D., Ziolko, S.K., James, J.A., Snitz, B.E., Houck, P.R., Bi, W., Cohen, A.D., Lopresti, B.J., DeKosky, S.T., Halligan, E.M., and Klunk, W.E. Frequent amyloid deposition without significant cognitive impairment among the elderly. *Archives of Neurology* 65:1509-1517, 2008. PMCID: 2636844
- Butters, M.A., Young, J.B., Lopez, O., Aizenstein, H.J., Reynolds, C.F., DeKosky, S.T. and Becker, J.T. Pathways linking late-life depression to persistent cognitive impairment and dementia. *Dialogues Clin Neurosci* 10:345-357, 2008. PMCID: 2872078
- Lingler, J.H., Hirschman, K.B., Garand, L., Dew, M.A., Becker, J.T., Schulz, R. and DeKosky, S.T. Frequency and correlates of advance planning among cognitively impaired older adults. *Am J Geriatr Psychiatry* 16:643-649, 2008. PMCID: 2578353
- Tyurin, V.A., Tyurina, Y.Y., Kochanek, P.M., Hamilton, R., DeKosky, S.T., Greenberger, J.S., Bayir, H. and Kagan, V.E. Oxidative lipidomics of programmed cell death. *Methods Enzymol* 442:375-393, 2008. PMID: 18662580
- Lopez, O.L. and DeKosky, S.T. Clinical symptoms in Alzheimer's disease. *Handb Clin Neurol* 89:207-216, 2008. PMID: 18631745
- Raji, C.A., Becker, J.T., Tsopelas, N.D., Price, J.C., Mathis, C.A., Saxton, J.A., Lopresti, B.J., Hoge, J.A., Ziolko, S.K., DeKosky, S.T. and Klunk, W.E. Characterizing regional correlation, laterality and symmetry of amyloid deposition in mild cognitive impairment and Alzheimer's disease with Pittsburgh Compound B. *J Neurosci Methods* 172:277-282, 2008. PMCID: 2501111
- Minster, R.L., DeKosky, S.T. and Kamboh, M.I. No association of SORL1 SNPs with Alzheimer's disease. *Neurosci Lett* 440:190-192, 2008. PMCID: 2519047
- Wolk, D.A., Signoff, E.D. and DeKosky, S.T. Recollection and familiarity in amnestic mild cognitive impairment: A global decline in recognition memory. *Neuropsychologia* 46:1965-1978, 2008. PMCID: 2519866
- Drzezga, A., Grimmer, T., Henriksen, G., Stangier, I., Perneczky, R., Diehl-Schmid, J., Mathis, C.A., Klunk, W.E., Price, J., DeKosky, S., Wester, H.J., Schwaiger, M. and Kurz, A. Imaging of amyloid plaques and cerebral glucose metabolism in semantic dementia and Alzheimer's disease. *Neuroimage* 39:619-633, 2008. PMID: 17962045
- Figgins, J.A., Minster, R.L., Demirci, F.Y., DeKosky, S.T., and Kamboh, M.I. Association studies of 22 candidate SNPs with late-onset Alzheimer's disease. *Am J Med Genet (Neuropsychiatr Genet)* 150B:520-526, 2009. PMCID: 2751631
- Bhalla, R.K., Butters, M.A., Becker, J.T., Houck, P.R., Snitz, B.E., Lopez, O.L., Aizenstein, H.J., Raina, K.D., DeKosky, S.T., and Reynolds, C.F. Patterns of mild cognitive impairment following treatment of depression in the elderly. *American Journal of Geriatric Psychiatry* 17:308-316, 2009. PMCID: 2782929
- Abrahamson, E. E., Ikonomovic, M.D., Dixon, D.E. and DeKosky, S.T. Simvastatin therapy prevents brain trauma-induced elevations in β -amyloid peptide levels. *Annals of Neurology* 66:407-414 2009. PMID: 19798641
- Andrieu, S., Coley, N., Aisen, P., Carrillo, M.C., DeKosky, S., Durga, J. et al. Methodological issues in primary prevention trials for neurodegenerative dementia. *Journal of Alzheimer's Disease* 16:235-270, 2009. PMID: 19221415

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Reiman, E.M., Chen, K., Liu, X., Bandy, D., Yu, M., Lee, W., Ayutyanont, N., Keppler, J., Reeder, S.A., Langbaum, J., Alexander, G.E., Klunk, W.E., Mathis, C.A., Price, J.C., Aizenstein, H.J., DeKosky, S.T., and Caselli, R.J. Fibrillar amyloid beta burden in cognitively normal people at three levels of genetic risk for Alzheimer's disease. *Proceedings of the National Academy of Sciences USA* 106:6820-6825, 2009. PMCID: 2665196

Nahin, R.L., Pecha, M., Welmerink, D.B., Sink, K., DeKosky, S.T. and Fitzpatrick, A.L. Concomitant use of prescription drugs and dietary supplements in ambulatory elderly people. *J Am Geriatr Soc* 57:1197-1205, 2009. PMID: 19515113

Ikonomic, M.D., Wecker, L., Abrahamson, E.E., Wuu, J., Counts, S.E., Ginsberg, S.D., Mufson, E.J. and DeKosky, S.T. Cortical alpha 7 nicotinic acetylcholine receptor and beta-amyloid levels in early Alzheimer disease. *Arch Neurol* 66:646-651, 2009. PMCID: 2841566

Leverenz, J.B., Lopez, O.L. and DeKosky, S.T. The expanding role of genetics in the Lewy body diseases: The glucocerebrosidase gene. *Arch Neurol* 66:555-556, 2009. PMCID: 2763140

Snitz, B.E., Saxton, J., Lopez, O.L., Ives, D.G., Dunn, L.O., Rapp, S.R., Carlson, M.C., Fitzpatrick, A.L. and DeKosky, S.T. Identifying mild cognitive impairment at baseline in the Ginkgo Evaluation of Memory (GEM) Study. *Aging Ment Health* 13:171-182, 2009. PMCID: 2767255

McNamee, R.L., Yee, S.H., Price, J.C., Klunk, W.E., Rosario, B., Weissfeld, L., Ziolko, S., Berginc, M., Lopresti, B., DeKosky, S. and Mathis, C.A. Consideration of optimal time window for Pittsburgh Compound B PET summed uptake measurements. *J Nucl Med* 50:348-355, 2009. PMCID: 2694747

Wiley, C.A., Lopresti, B.J., Venneti, S., Price, J., Klunk, W.E., DeKosky, S.T. and Mathis, C.A. Carbon 11-labeled Pittsburgh Compound B and carbon 11-labeled (R)-PK11195 positron emission tomographic imaging in Alzheimer disease. *Arch Neurol* 66:60-67, 2009. PMCID: 2666881

Maki, R.A., Tyurin, V.A., Lyon, R.C., Hamilton, R.L., DeKosky, S.T., Kagan, V.E. and Reynolds, W.F. Aberrant expression of myeloperoxidase in astrocytes promotes phospholipid oxidation and memory deficits in a mouse model of Alzheimer's disease. *J Biol Chem* 284:3158-3169, 2009. PMCID: 2631957

Conley, Y.P., Mukherjee, A., Kammerer, C., DeKosky, S.T., Kamboh, M.I., Finegold, D.N. and Ferrell, R.E. Evidence supporting a role for the calcium-sensing receptor in Alzheimer disease. *Am J Med Genet B Neuropsychiatr Genet* 150B:703-709, 2009. PMCID: 3062902

Iwakiri, M., Mizukami, K., Ikonomic, M.D., Ishikawa, M., Abrahamson, E.E., DeKosky, S.T. and Asada, T. An immunohistochemical study of GABA A receptor gamma subunits in Alzheimer's disease hippocampus: Relationship to neurofibrillary tangle progression. *Neuropathology* 29:263-269, 2009. PMCID: 3078755

Snitz, B.E., O'Meara, E.S., Carlson, M.C., Arnold, A., Ives, D.G., Rapp, S.R., Saxton, J., Lopez, O.L., Dunn, L.O., Sink, K.M. and DeKosky, S.T. Ginkgo biloba for preventing cognitive decline in older adults: A randomized trial. *JAMA* 302:2663-2670, 2009. PMCID: 2832285

Saxton J, Snitz BE, Lopez OL, Ives DG, Dunn LO, Fitzpatrick A, Carlson MC, DeKosky ST. Functional and cognitive criteria produce different rates of MCI. *J Neurol Neurosurg Psychiatry* 80:734-743, 2009. PMCID: 2698042

Minster, R.L., Demirci, F.Y., DeKosky, S.T. and Kamboh, M.I. No association between CALHM1 variation and risk of Alzheimer disease. *Hum Mutat* 30:E566-E569, 2009. PMCID: 2810280

Weamer, E.A., Emanuel, J.E., Varon, D., Miyahara, S., Wilkosz, P.A., Lopez, O.L., DeKosky, S.T. and Sweet, R.A. The relationship of excess cognitive impairment in MCI and early Alzheimer's disease to the subsequent emergence of psychosis. *Int Psychogeriatr* 21:78-85, 2009. PMCID: 2678562

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Minster, R.L., DeKosky, S.T. and Kamboh, M.I. No association of DAPK1 and ABCA2 SNPs on chromosome 9 with Alzheimer's disease. *Neurobiol Aging* 30:1890-1891, 2009. PMCID: 2763561

Cohen, A.D., Ikonomovic, M.D., Abrahamson, E.E., Paljug, W.R., DeKosky, S.T., Lefterov, I.M., Koldamova, R.P., Shao, L., Debnath, M.L., Mason, N.S., Mathis, C.A. and Klunk, W.E. Anti-amyloid effects of small molecule A β binding agents in PSP1/APP mice. *Lett Drug Des Discov* 6:437, 2009. PMCID: 2812908

Lopez OL, Becker JT, Wahed AS, Saxton J, Sweet RA Dr, Wolk DA, Klunk W, DeKosky ST. Long-term effects of the concomitant use of memantine with cholinesterase inhibition in AD. *J Neurol Neurosurg Psychiatr* 80:600-607, 2009. PMCID: 2823571

Chapuis, J., Hot, D., Hansmannel, F., Kerdraon, O., Ferreira, S., Hubans, C., Maurage, C.A., Hout, L., Bensemain, F., Laumet, G., Ayral, A.M., Fievet, N., Hauw, J.J., DeKosky, S.T. et al. Transcriptomic and genetic studies identify IL-33 as a candidate gene for Alzheimer's disease. *Molecular Psychiatry* 14:1004-1016, 2009. PMCID: 2860783

Cohen, A., Price, J., Weissfeld, L., James, J., Rosario, B., Bi, W., Nebes, R., Saxton, J., Snitz, B., Aizenstein, H., Wolk, D., DeKosky, S.T., Mathis, C. and Klunk, W. Basal cerebral metabolism may modulate the cognitive effects of A β in mild cognitive impairment: An example of brain reserve. *Journal of Neuroscience* 29:14770-14778, 2009. PMCID: 2810461

Holland, D., Brewer, J.B., Hagler, D.J., Fenema-Notestine, C., Dale, A.M.; the Alzheimer's Disease Neuroimaging Initiative, Weiner, M., Thal, L., Petersen, R., Jack, C.R. Jr, Jagust, W., Trojanowski, J., Toga, A.W., Beckett, L., Green, R.C., Gamst, A., Potter, W.Z., Montine, T., Anders, D., Bernstein, M., Felmlee, J., Fox, N., Thompson, P., Schuff, N., Alexander, G., Bandy, D., Koeppe, R.A., Foster, N., Reiman, E.M., Chen, K., Shaw, L., Lee, V.M., Korecka, M., Crawford, K., Neu, S., Harvey, D., Kornak, J., Kachaturian, Z., Frank, R., Snyder, P.J., Molchan, S., Kaye, J., Vorobik, R., Quinn, J., Schneider, L., Pawluczyk, S., Spann, B., Fleisher, A.S., Vanderswag, H., Heidebrink, J.L., Lord, J.L., Johnson, K., Doody, R.S., Villanueva-Meyer, J., Chowdhury, M., Stern, Y., Honig, L.S., Bell, K.L., Morris, J.C., Mintun, M.A., Schneider, S., Marson, D., Griffith, R., Badger, B., Grossman, H., Tang, C., Stern, J., Detoledo-Morrell, L., Shah, R.C., Bach, J., Duara, R., Isaacson, R., Strauman, S., Albert, M.S., Pedroso, J., Toroney, J., Rusinek, H., de Leon, M.J., De Santi, S.M., Doraiswamy, P.M., Petrella, J.R., Aiello, M., Clark, C.M., Pham, C., Nunez, J., Smith, C.D., Given, C.A., Hardy, P., DeKosky, S.T. et al. Subregional neuroanatomical change as a biomarker for Alzheimer's disease. *Proc Natl Acad Sci USA* 106:20954-20959, 2009. PMCID: 2791580

Kuller, L.H., Ives, D.G., Fitzpatrick, A.L., Carlson, M.C., Mercado, C., Lopez, O.L., Burke, G.L., Furberg, C.D. and DeKosky, S.T. Does Ginkgo biloba reduce the risk of cardiovascular events? *Circ Cardiovasc Qual Outcomes* 3:41-47, 2010. PMCID: 2858335

Omalu, B., Hamilton, R., Kamboh, M., DeKosky, S., and Bailes, J. Chronic traumatic encephalopathy in a National Football League (NFL) player: Case report and emerging medico-legal practice questions. *Journal of Forensic Nursing* 6:40-46, 2010. PMID: 20201914

Snitz, B.E., Arnold, A.M. and DeKosky, S.T. Ginkgo biloba and cognitive decline. *JAMA* 303:1477-1478, 2010. Van Deerlin, V.M., Sleiman, P.M.A., Martinez-Lage, M., Chen-Plotkin, A., Wang, L.-S., Graff-Radford, N.R., Dickson, D.W., Rademakers, R., Boeve, B.F., Grossman, M., Arnold, S.E., Mann, D.M.A., Pickering-Brown, S.M., Seelaar, H., Heutink, P., van Swieten, J.C., Murrell, J.R., Ghetti, B., Spina, S., Grafman, J., Hodges, J., Spillantini, M.G., Gilman, S., Lieberman, A.P., Kaye, J.A., Woltjer, R.L., Bigio, E.H., Mesulam, M., al-Sarraj, S., Troakes, C., Rosenberg, R.N., White, C.L., Ferrer, I., Llado, A., Neumann, M., Kretzschmar, H.A., Hulette, C.M., Welsh-Bohmer, K.A., Miller, B.L., Alzualde, A., de Munain, A.L., McKee, A.C., Gearing, M., Levey, A.I., Lah, J.J., Hardy, J., Rohrer, J.D., Lashley, T., Mackenzie, I.R.A., Feldman, H.H., Hamilton, R.L., DeKosky, S.T. et al. Common variants at 7p21 are associated with frontotemporal lobar degeneration with TDP-43 inclusions. *Nature Genetics* 42:234-239, 2010. PMCID: 2828525

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

- Tyurin, V.A., Tyurina, Y.Y., Ritov, V.B., Lysytsya, A., Amoscato, A.A., Kochanek, P.M., Hamilton, R., DeKosky, S.T., Greenberger, J.S., Bayir, H., and V.E. Kagan. Oxidative lipidomics of apoptosis: Quantitative assessment of phospholipid hydroperoxides in cells and tissues. *Methods Mol Biol* 610:353-374, 2010. PMCID: 20013189
- Wilkosz, P.A., Seltman, H.J., Devlin, B., Weamer, E.A., Lopez, O.L., DeKosky, S.T. and Sweet, R.A. Trajectories of cognitive decline in Alzheimer's disease. *Int Psychogeriatr* 22:281-290, 2010. PMCID: 2834298
- Faulkner, L.R., Juul, D., Pascuzzi, R.M., Aminoff, M.J., Crumrine, P.K., DeKosky, S.T., Jozefowicz, R.F., Massey, J.M., Pirzada, N. and Tilton, A. Trends in American Board of Psychiatry and Neurology specialties and neurologic subspecialties. *Neurology* 75:1110-1117, 2010. PMID: 20855855
- Hansmannel, F., Sillaire, A., Kamboh, M.I., Lendon, C., Pasquier, F., Hannequin, D., Laumet, G., Mounier, A., Ayral, A.-M., DeKosky, S.T., Hauw, J.-J., Berr, C., Mann, D., Amouyel, P., Campion, D. and Lambert, J.-C. Is the urea cycle involved in Alzheimer's disease? *Journal of Alzheimer's Disease* 21:1013-1021, 2010. PMCID: 2945690
- Lambert, J.C., Sleegers, K., Gonzalez-Perez, A., Ingelsson, M., Beecham, G.W., Hiltunen, M., Combarros, O., Bullido, M.J., Brouwers, N., Bettens, K., Berr, C., Pasquier, F., Richard, F., DeKosky, S.T. et al. The CALHM1 P86L polymorphism is a genetic modifier of age at onset in Alzheimer's disease: A meta-analysis study. *J Alzheimers Dis* 22:247-255, 2010. PMCID: 2964875
- DeKosky, S.T., Ikonomovic, M.D. and Gandy, S. Traumatic brain injury: Football, warfare, and long-term effects. *New England Journal of Medicine* 363:1293-1296, 2010. PMID: 21265421
- Gabel, M.J., Foster, N.L., Heidebrink, J.L. and Higdon, R. for the Pilot PET Study Group (Aizenstein, H.J., Arnold, S.E., Barbas, N.R., Boeve, B.F., Burke, J.R., Clark, C.M., DeKosky, S.T., Farlow, M.R., Foster, N.L., Gabel, M.J., Heidebrink, J.L., Higdon, R., Jagust, W.J., Kawas, C.H., Koeppe, R.A., Leverenz, J.B., Lipton, A.M., Peskind, E.R., Turner, R.S., Womack, K.B. and Zamrini, E.Y.). Validation of consensus panel diagnosis in dementia. *Archives of Neurology* 67:1506-1512, 2010. PMCID: 3178413
- Dubois, B., Feldman, H.H., Jacova, C., Cummings, J. DeKosky, S.T., Barberger-Gateau, P., Delacourte, A., Frisoni, G. et al. Revising the definition of Alzheimer's disease: A new lexicon. *Lancet Neurology* 9:1118-1127, 2010. PMID: 20934914
- Reynolds, C.F., Butters, M.A., Lopez, O., Pollock, B.G., Dew, M.A., Mulsant, B.H., Lenze, E.J., Holm, M., Rogers, J.C., Mazumdar, S., Houck, P.R., Begley, A., Anderson, S., Karp, J.F., Miller, M.D., Whyte, E.M., Stack, J., Gildengers, A., Szanto, K., Bensasi, S., Kaufer, D.I., Kamboh, I. and DeKosky, S.T. Maintenance treatment of depression in old age: A randomized, double-blind, placebo-controlled evaluation of the efficacy and safety of donepezil combined with antidepressant pharmacotherapy. *Archives of General Psychiatry* 68:51-60, 2011. PMCID: 3076045
- DeKosky, S.T., Carrillo, M.C., Phelps, C., Knopman, D., Petersen, R.C., Frank, R., Schenk, D., Masterman, D., Siemers, E.R., Cedarbaum, J.M., Gold, M., Miller, D.S., Morimoto, B.H., Khachaturian, A.S. and Mohs, R.C. Revision of the criteria for Alzheimer's disease: A symposium. *Alzheimer's & Dementia* 7:e1-e12, 2011. PMID: 21322828
- Brodaty, H., Breteler, M., DeKosky, S., Dorenlot, P., Fratiglioni, L., Hock, C., Kenigsberg, P.A., Scheltens, P. and De Strooper B. The world of dementia beyond 2020. *Journal of the American Geriatrics Society* 59:923-927, 2011. PMID: 21488846
- Burns, L.C., Minster, R.L., Demirci, F.Y., Barmada, M.M., Ganguli, M., Lopez, O.L., DeKosky, S.T. and Kamboh, M.I. Replication study of genome-wide associated SNPs with late-onset Alzheimer's disease. *Am J Med Genet B Neuropsychiatr Genet* 156B:507-512, 2011. PMCID: 3082594

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Wolk, D.A., Dunfee, K.L., Dickerson, B.C., Aizenstein, H.J. and DeKosky, S.T. A medial temporal lobe division of labor: Insights from memory in aging and early Alzheimer disease. *Hippocampus* 21:461-466, 2011. PMCID: 2918673

Womack, K.B., Diaz-Arrastia, R., Aizenstein, H.J., Arnold, S.E., Barbas, N.R., Boeve, B.F., Clark, C.M., DeCarli, C.S., Jagust, W.J., Leverenz, J.B., Peskind, E.R., Turner, R.S., Zamrini, E.Y., Heidebrink, J.L., Burke, J.R., DeKosky, S.T. et al. Temporoparietal hypometabolism in frontotemporal lobar degeneration and associated imaging diagnostic errors. *Archives of Neurology* 68:329-337, 2011. PMCID: 3058918

Albert, M.S., DeKosky, S.T., Dickson, D., Dubois, B., Feldman, H.H., Fox, N.C., Gamst, A., Holtzman, D.M., Jagust, W.J., Petersen, R.C., Synder, P.J., Carrillo, M.C., Thies, B. and Phelps, C.H. The diagnosis of mild cognitive impairment due to Alzheimer's disease: Recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease. *Alzheimers Dement* 7:270-279, 2011. PMCID: 3312027

Alzheimer Disease Genetics Consortium (DeKosky, S.T. co-author). Common variants at MS4A4/MS4A6E, CD2AP, CD33 and EPHA1 are associated with late-onset Alzheimer's disease . *Nature Genetics* 43:436-441, 2011. PMCID: 3090745

Garand, L., Dew, M.A., Lingler, J.H. and DeKosky, S.T. Incidence and predictors of advance care planning among persons with cognitive impairment. *American Journal of Geriatric Psychiatry* 19:712-720, 2011. PMCID: 3145957

Ikonomovic, M.D., Klunk, W.E., Abrahamson, E.E., Wuu, J., Mathis, C.A., Scheff, S.W., Mufson, E.J. and DeKosky, S.T. Precuneus amyloid burden is associated with reduced cholinergic activity in Alzheimer disease. *Neurology* 77:39-47, 2011. PMCID: 3127332

Mufson, E.J., Binder, L., Counts, S.E., DeKosky, S.T., Detoledo-Morrell, L., Ginsberg, S.D., Ikonomovic, M.D., Perez, S.E. and Scheff, S.W. Mild cognitive impairment pathology and mechanisms. *Acta Neuropathol* 123:13-30, 2012. PMCID: 3282485

Kamboh, M.I., Minster, R.L., Demirci, F.Y., Ganguli, M., DeKosky, S.T., Lopez, O.L. and Barmada, M.M. Association of CLU and PICALM variants with Alzheimer's disease. *Neurobiol Aging* 33:518-521, 2012. PMCID: 3010357

Yasar, S., Lin, F.-M., Fried, L.P., Kawas, C.H., Sink, K.M., DeKosky, S.T. and Carlson, M.C. Diuretic use is associated with better learning and memory in older adults in the Ginkgo Evaluation of Memory study. *Alzheimer's and Dementia* 8:188-195, 2012. PMCID: 3341535

Ikonomovic, M.D., Abrahamson, E.E., Price, J.C., Hamilton, C.A., Paljug, W.R., Debnath, M.L., Cohen, A.D., Mizukami, K., DeKosky, S.T., Lopez, O.L. and Klunk, W.E. Early AD pathology in a [C-11]PiB-negative case: A PiB-amyloid imaging, biochemical, and immunohistochemical study. *Acta Neuropathol* 123:433-447, 2012. PMCID: 3383058

Gandy, S. and DeKosky, S.T. APOE E4 status and traumatic brain injury on the gridiron or the battlefield. *Science Translational Medicine* 4:134ed4, 2012. PMID: 22593171

Kamboh, M.I., Demirci, F.Y., Wang, X., Minster, R.L., Carrasquillo, M.M., Pankratz, V.S., Younkin, S.G., Saykin, A.J., Jun, G., Baldwin, C., Logue, M.W., Buros, J., Farrer, L., Pericak-Vance, M.A., Haines, J.L., Sweet, R.A., Ganguli, M., Feingold, E., DeKosky, S.T., Lopez, O.L. and Barmada, M.M. Genome-wide association study of Alzheimer's disease. *Translational Psychiatry* 2:e117-123, 2012. PMCID: 3365264

Garand, L., Lingler, J.H., Deardorf, K., Reynolds, C.F., DeKosky, S.T., Schulz, R. and Dew, M.A. Anticipatory grief in new family caregivers of persons with mild cognitive impairment and dementia. *Alzheimer's Disease & Associated Disorders: An International Journal* 26:159-165, 2012. PMCID: 3251637

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Bettermann, K., Arnold, A.M., Williamson, J., Rapp, S., Sink, K., Toole, J.F., Carlson, M.C., Yasar, S., DeKosky, S. and Burke, G.L. Statins, risk of dementia, and cognitive function: Secondary analysis of the Ginkgo Evaluation of Memory Study. *J Stroke Cerebrovasc Dis* 21:436-444, 2012. PMCID: 3140577

Choi, S.H., Olabarrieta, M., Lopez, O.L., Maruca, V., DeKosky, S.T., Hamilton, R.L. and Becker, J.T. Gray matter atrophy associated with extrapyramidal signs in the Lewy body variant of Alzheimer's disease. *Journal of Alzheimer's Disease* 32:1043-1049, 2012. PMCID: 3589734

Lopez, O.L., Becker, J.T., Chang, Y.F., Sweet, R.A., DeKosky, S.T., Gach, M.H., Carmichael, O.T., McDade, E. and Kuller, L.H. Incidence of mild cognitive impairment in the Pittsburgh Cardiovascular Health Study- Cognition Study. *Neurology* 79:1599-1606, 2012. PMCID: 3475628

Kamboh, M.I., Barmada, M.M., Demirci, F.Y., Minster, R.L., Carrasquillo, M.M., Pankratz, V.S., Younkin, S.G., Saykin, A.J., Sweet, R.A., Feingold, E., DeKosky, S.T. and Lopez, O.L. Genome-wide association analysis of age-at-onset in Alzheimer's disease. *Molecular Psychiatry* 17:1340-1346, 2012. PMCID: 3262952

Wolk, D.A., Price, J.C., Madeira, C., Saxton, J.A., Snitz, B.E., Lopez, O.L., Mathis, C.A., Klunk, W.E. and DeKosky, S.T. Amyloid imaging in dementias with atypical presentation. *Alzheimer's and Dementia* 8:389-398, 2012. PMCID: 3517915

De Gasperi, R., Gama Sosa, M.A., Kim, S.H., Steele, J.W., Shaughness, M.C., Maudlin-Jeronimo, E., Hall, A.A., DeKosky, S.T., McCarron, R.M., Nambiar, M.P., Gandy, S., Ahlers, S.T. and Elder, G.A. Acute blast injury reduces brain abeta in two rodent species. *Frontiers in Neurotrauma* 3, 1-11, 2012. PMCID: 3527696

Hollingsworth, P., Sweet, R., Sims, R., Harold, D., Russo, G., Abraham, R., Stretton, A., Jones, N., Gerrish, A., Chapman, J., Ivanov, D., Moskvina, V., Lovestone, S., Priotsi, P., Lupton, M., Brayne, C., Gill, M., Lawlor, B., Lynch, A., Craig, D., McGuinness, B., Johnston, J., Holmes, C., Livingston, G., Bass, N.J., Gurling, H., McQuillin, A., the GERAD Consortium, the National Institute on Aging Late-Onset Alzheimer's Disease Family Study Group, Holmans, P., Jones, L., Devlin, B., Klei, L., Barmada, M.M., Demirci, F.Y., DeKosky, S.T., Lopez, O.L., Passmore, P., Owen, M.J., O'Donovan, M.C., Mayeux, R., Kamboh, M.I. and Williams, J. Genome-wide association study of Alzheimer's disease with psychotic symptoms. *Molecular Psychiatry* 17:1316-1327, 2012. PMCID: 3272435

Gandy, S. and DeKosky, S.T. 2012: The year in dementia. *Lancet Neurology* 12:4-6, 2013. PMCID: 4006941

Juul, D., Flynn, F.G., Gutmann, L., Pascuzzi, R.M., Webb, L., Massey, J.M., DeKosky, S.T., Foertsch, M. and Faulkner, L.R. Association between performance on Neurology In-Training and Certification Examinations. *Neurology* 80:206-209, 2013. PMCID: 3589193

Gandy, S. and DeKosky, S.T. Toward the treatment and prevention of Alzheimer's disease: Rational strategies and recent progress. *Annual Review of Medicine* 64:367-383, 2013. PMCID: 3625402

Spina, S., Van Laar, A.D., Murrell, J.R., Hamilton, R.L., Kofler, J.K., Epperson, F., Farlow, M.R., Lopez, O., Quinlan, J., DeKosky, S.T. and Ghetti, B. Phenotypic variability in three families with *Valosin-Containing Protein* mutation. *European Journal of Neurology* 20:251-258, 2013. PMCID: 3734548

Gandy, S., Haroutunian, V., DeKosky, S.T., Sano, M. and Schadt, E.E. CR1 and the "vanishing amyloid" hypothesis of Alzheimer's disease. *Biological Psychiatry* 73:393-395, 2013. PMCID: 3600375

DeKosky, S.T., Blennow, K., Ikonomovic, M.D. and Gandy, S. Acute and chronic traumatic encephalopathies: Pathogenesis and biomarkers. *Nature Reviews Neurology* 9:192-200, 2013. PMCID: 4006940

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Snitz, B.E., Weissfeld, L.A., Lopez, O.L., Kuller, L.H., Saxton, J., Singhbabu, D.M., Klunk, W.E., Mathis, C.A., Price, J.C., Ives, D.G., Cohen, A.D., McDade, E. and DeKosky, S.T. Cognitive trajectories associated with beta-amyloid deposition in the oldest old without dementia. *Neurology*, 80:1378-1384, 2013. PMCID: 3662268

Abrahamson, E.E., Foley, L.M., DeKosky, S.T., Hitchens, T., Ho, C., Kochanek, P.M. and Ikonomovic, M.D. Cerebral blood flow changes after brain injury in human amyloid-beta knock-in mice. *Journal of Cerebral Blood Flow & Metabolism* 33:826-833, 2013. PMCID: 3677107

Cohen, A.D., Mowrey, W., Weissfeld, L.A., Aizenstein, H.J., McDade, E., Mountz, J.M., Nebes, R.D., Saxton, J.A., Snitz, B., DeKosky, S., Williamson, J., Lopez, O.L., Price, J.C., Mathis, C.A. and Klunk, W.E. Classification of amyloid-positivity in controls: Comparison of visual read and quantitative approaches. *NeuroImage* 71:207-215, 2013. PMCID: 3605888

Lopez, O.L., Becker, J.T., Chang, Y.-F., Sweet, R.A., Aizenstein, H., Snitz, B., Saxton, J., McDade, E., Kamboh, M.I., DeKosky, S.T., Reynolds, C.F. and Klunk, W.E. The long-term effects of typical and atypical antipsychotics in patients with probable Alzheimer's disease. *Am J Psychiatry* 170:1051-1058, 2013. PMCID: 3990263

Mathis, C.A., Kuller, L.H., Klunk, W.E., Snitz, B.E., Price, J.C., Weissfeld, L.A., Rosario, B.L., Lopresti, B.J., Saxton, J.A., Aizenstein, H.J., McDade, E.M., Kamboh, M.I., DeKosky, S.T. and Lopez, O.L. In vivo assessment of amyloid-deposition in nondemented very elderly subjects. *Annals of Neurology* 73:751-761, 2013. PMCID: 3725727

Yasar, S., Xia, J., Yao, W., Furberg, C.D., Xue, Q.-L., Mercado, C.I., Fitzpatrick, A.L., Fried, L.P., Kawas, C.H., Sink, K.M., Williamson, J.D., DeKosky, S.T. and Carlson, M.C. Antihypertensive drugs decrease risk of Alzheimer's disease: Ginkgo Evaluation of Memory Study. *Neurology* 81:896-903, 2013. PMCID: 3885216

Holton, P., Ryten, M., Nalls, M., Trabzuni, D., Weale, M.E., Hernandez, D., Crehan, H., Gibbs, J.R., Mayeux, R., Haines, J.L., Farrer, L.A., Pericak-Vance, M.A., Schellenberg, G.D., Alzheimer's Disease Genetics Consortium, Ramirez-Restrepo, M., Engel, A., Myers A.J., Corneveaux, J.J., Huettel, M.J., Dillmann, A., Cookson, M.R., Reiman, E.M., Singleton, A., Hardy, J., Guerreiro, R., Apostolova, L.G., Arnold, S.E., Baldwin, C.T., Barber, R., Barmada, M.M., Beach, T.G., Beecham, G.W., Beekly, D., Bennett, D.A., Bigio, E.H., Bird, T.D., Blacker, D., Boeve, B.F., Bowen, J.D., Boxer, A., Burke, J.R., Buros, J., Buxbaum, J.D., Cairns, N.J., Cantwell, L.B., Cao, C., Carlson, C.S., Carney, C.M., Carrasquillo, M.M., Carroll, S.L., Chui, H.C., Clark, D.G., Cotman, C.W., Crane, P.K., Crocco, E.A., Cruchaga, C., Cummings, J.L., DeJager, P.L., DeCarli, C., DeKosky, S.T. et al. Initial assessment of the pathogenic mechanisms of the recently identified Alzheimer risk loci. *Annals of Human Genetics* 77:85-105, 2013. PMCID: 3578142

Hughes, T.M., Kuller, L.H., Barinas-Mitchell, E.J., Mackey, R.H., McDade, E.M., Klunk, W.E., Aizenstein, H.J., Cohen, A.D., Snitz, B.E., Mathis, C.A., DeKosky, S.T. and Lopez, O.L. Pulse wave velocity is associated with beta-amyloid deposition in the brains of very elderly adults. *Neurology* 81:1711-1718, 2013. PMCID: 3812104

Reitz C, Mayeux R (Alzheimer's Disease Genetics Consortium); Collaborators: Albert, M.S., Albin, R.L., Apostolova, L.G., Arnold, S.E., Baldwin, C.T., Barber, R., Barnada, M.M., Barnes, L.L., Beach, T.G., Beecham, G.W., Beekly, D., Bennett, D.A., Bigio, E.H., Bird, T.D., Blacker, D., Boeve, B.F., Bowen, J.D., Boxer, A., Burke, J.R., Buxbaum, J.D., Byrd, G.S., Cai, G., Cairns, N.J., Cantwell, L.B., Cao, C., Carlson, C.S., Carney, R.M., Carroll, S.L., Chui, H.C., Clark, D.G., Crane, P.K., Cribbs, D.H., Crocco, E.A., Cruchaga, C., DeCarli, C., DeKosky, S.T. et al (Alzheimer's Disease Genetics Consortium). TREM2 and neurodegenerative disease. *New England Journal of Medicine* 369:1564-1565, 2013. PMID: 24131184

Miyashita, A., Koike, A., Jun, G., Wang, L.S., Takahashi, S., Matsubara, E., Kawarabayashi, T., Shoji, M., Tomita, N., Arai, H., Asada, T., Harigaya, Y., Ikeda, M., Amari, M., Hanyu, H., Higuchi, S., Ikeuchi, T., Nishizawa, M., Suga, M., Kawase, Y., Akatsu, H., Kosaka, K., Yamamoto, T., Imagawa, M., Hamaguchi, T., Yamada, M., Morihisa, T., Takeda, M., Takao, T., Nakata, K., Fujisawa, Y., Sasaki, K., Watanabe, K., Nakashima, K., Urakami, K., Ooya, T., Takahashi, M., Yuzuriha, T., Serikawa, K., Yoshimoto, S., Nakagawa, R., Kim, J.W., Ki,

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

C.S., Won, H.H., Na, D.L., Seo, S.W., Mook-Jung, I., Alzheimer Disease Genetics Consortium, St. George-Hyslop, P., Mayeux, R., Haines, J., Pericak-Vance, M., Yoshida, M., Nishida, N., Tokunaga, K., Yamamoto, K., Tsuji, S., Kanazawa, I., Ihara, Y., Schellenberg, G., Farrer, L., Kuwano, R.; Collaborators: Albert, M.S., Albin, R.L., Apostolova, L.G., Arnolds, S.E., Baldwin, C.T., Barber, R., Barmada, M.M., Barnes, L.L., Beach, T.G., Beecham, G.W., Beekly, D., Bennett, D.A., Bigio, E.H., Bird, T.D., Blacker, D., Boeve, B.F., Bowen, J.D., Boxer, A., Burke, J.R., Buxbaum, J.D., Cairns, N.J., Cantwell, L.B., Cao, C., Carlson, C.S., Carney, R.M., Carrasquillo, M.M., Carroll, S.L., Chui, H.C., Clark, D.G., Corneveaux, J., Crane, P.K., Cribbs, D.H., Crocco, E.A., Cruchaga, C., De Jager, P.L., DeCarli, C., DeKosky, S.T. et al. SORL1 is genetically associated with late-onset Alzheimer's disease in Japanese, Koreans and Caucasians. *PLoS One* 8:e58618, 2013. PMCID: 3614978

Reitz, C., Jun, G., Naj, A., Rajbhandary, R., Vardarajan, B.N., Wang, L.S., Valladares, O., Lin, C.F., Larson, E.B., Graff-Radford, N.R., Evans, D., De Jager, P.L., Crane, P.K., Buxbaum, J.D., Murrell, J.R., Raj, T., Ertekin-Taner, N., Logue, M., Baldwin, C.T., Green, R.C., Barnes, L.L., Cantwell, L.B., Fallin, M.D., Go, R.C., Griffith, P., Obisesan, T.O., Manly, J.J., Lunetta, K.L., Kamboh, M.I., Lopez, O.L., Bennett, D.A., Hendrie, H., Hall, K.S., Goate, A.M., Byrd, G.S., Kukull, W.A., Foroud, T.M., Haines, J.L., Farrer, L.A., Pericak-Vance, M.A., Schellenberg, G.D., Mayeux, R. (Alzheimer Disease Genetics Consortium); Collaborators: Albert, M.S., Albin, R.L., Apostolova, L.G., Arnold, S.E., Barber, R., Barmada, M.M., Beach, T.G., Beecham, G.W., Beekly, D., Bigio, E.H., Bird, T.D., Blacker, D., Boeve, B.F., Bowen, J.D., Boxer, A., Burke, J.R., Cai, G., Cairns, N.J., Cao, C., Carlson, C.S., Carney, R.M., Carroll, S.L., Chui, H.C., Clark, D.G., Cribbs, D.H., Crocco, E.A., Cruchaga, C., DeCarli, C., DeKosky, S.T. et al. Variants in the ATP-binding cassette transporter (ABCA7), apolipoprotein E E4, and the risk of late-onset Alzheimer disease in African Americans. *JAMA* 309:1483-1492, 2013. PMCID: 3667653

Harms, M., Benitez, B.A., Cairns, N., Cooper, B., Cooper, P., Mayo, K., Carrell, D., Faber, K., Williamson, J., Bird T., Diaz-Arrastia, R., Foroud, T.M., Boeve, B.F., Graff-Radford, N.R., Mayeux, R., Chakraverty, S., Goate, A.M., Cruchaga, C. (NIA-LOAD/NCRAD Family Study Consortium); Collaborators: Green, R., Kowall, N., Farrer, L., Williamson, J., Santana, V., Schmeichel, D., Gaskell, P., Welsh-Bohmer, K., Pericak-Vance, M., Ghetti, B., Farlow, M.R., Horner, K., Growdon, J.H., Blacker, D., Tanzi, R.E., Hyman, B.T., Boeve, B., Kuntz, K., Norgaard, L., Larson, N., Kistler, D., Parfitt, F., Haddow, J., Silverman, J., Beeri, M.S., Sano, M., Wang, J., Lally, R., Johnson, N., Mesulum, M., Weintraub, S., Bigio, E., Kaye, J., Kramer, P., Payne-Murphy, J., Bennett, D., Jacobs, H., Chang, J.S., Arends, D., Harrell, L., Bartzokis, G., Cummings, J., Lu, P.H., Toland, U., Markesberry, W., Smith, C., Brickhouse, A., Trojanowski, J., Van Deerlin, V., Wood, E.M., DeKosky, S.T. et al. C9orf72 hexanucleotide repeat expansions in clinical Alzheimer disease. *JAMA Neurol* 70:736-741, 2013. PMCID: 3681841.

Hughes, T.M., Lopez, O.L., Evans, R.W., Kamboh, M.I., Williamson, J.D., Klunk, W.E., Mathis, C.A., Price, J.C., Cohen, A.D., Snitz, B.E., DeKosky, S.T. and Kuller, L.H. Markers of cholesterol transport are associated with amyloid deposition in the brain. *Neurobiology of Aging* 35:802-807, 2014. PMCID: 3896052

DeKosky, S.T. and Gandy, S. Editorial: Environmental exposures and the risk for Alzheimer's Disease: Can we identify the smoking guns? *JAMA Neurology* 71:273-275, 2014. PMID: 24473699

Tate, J.A., Snitz, B.E., Alvarez, K.A., Nahin, R.L., Weissfeld, L.A., Lopez, O., Angus, D.C., Shah, F., Ives, D.G., Fitzpatrick, A.L., Williamson, J.D., Arnold, A.M., DeKosky, S.T. and Yende, S. for the GEM Study Investigators. Infection hospitalization increases risk of dementia in the elderly. *Critical Care Medicine* 42:1037-46, 2014. PMCID: 4071960

Dubois, B., Feldman, H.H., Jacova, C., Hampel, H., Molinuevo, J.L., Blennow, K., DeKosky, S.T. et al. Advancing research diagnostic criteria for Alzheimer's disease: The IWG-2 criteria. *Lancet Neurology* 13:614-629, 2014. PMID: 24849862

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Hughes, T.M., Kuller, L.H., Barinas-Mitchell, E.J., McDade, E.M., Klunk, W.E., Cohen, A.D., Mathis, C.A., DeKosky, S.T., Price, J.C. and Lopez, O.L. Arterial stiffness and beta-amyloid progression in nondemented elderly adults. *JAMA Neurology* 71:562-2568, 2014. PMID: 24687165

DeKosky, S.T. and Gandy, S. Alzheimer disease risk factors - reply. *JAMA Neurology* 71:1051-1052, 2014. PMID: 25111207

Alzheimer's Association National Plan Milestone Working Group, Fargo, K.N., Aisen, P., Albert, M., Au, R., Corrada, M.M., DeKosky, S. et al. 2014 report on the milestones for the US national plan to address Alzheimer's disease. *Alzheimer's & Dementia* 10:S430-S452, 2014.

DeKosky, S.T. Editorial: Studying the brain: Complexities at every level. *Neurology* 83:1040-1041, 2014. PMID: 25128178

Mitsis, E., Riggio, S., Kostakoglu, L., Dickstein, D., Machac, J., Delman, B., Goldstein, M., Jennings, D., D'Antonio, E., Martin, J., Naidich, T., Aloyisi, A., Fernandez, C., Seibyl, J., DeKosky, S. et al. Tauopathy PET and amyloid PET in the diagnosis of chronic traumatic encephalopathies: Studies of a retired NFL player and of a man with FTD and a severe head injury. *Translational Psychiatry* 4:e441, 2014. PMID: 25226550

Gandy, S., Ikonomovic, M.D., Mitsis, E., Elder, G., Ahlers, S.T., Barth, J., Stone, J.R. and DeKosky, S.T. Chronic traumatic encephalopathy: Clinical-biomarker correlations and current concepts in pathogenesis. *Molecular Neurodegeneration* 9:37, 2014.

Lopez, O.L., Klunk, W.E., Mathis, C., Coleman, R.L., Price, J., Becker, J.T., Aizenstein, H.J., Snitz, B., Cohen, A., Ikonomovic, M., McDade, E., DeKosky, S.T. et al. Amyloid, neurodegeneration, and small vessel disease as predictors of dementia in the oldest-old. *Neurology* 83:1804-1811, 2014.

Naj, A.C., Jun, G., Reitz, C., Kunkle, B.W., Perry, W., Park, Y.S., Beecham, G. W., Rajbhandary, R.A., Hamilton-Nelson, K.L., Wang, L.S., Kauwe, J.S., Huentelman, M.J., Myers, A.J., Bird, T.D., Boeve, B.F., Baldwin, C.T., Jarvik, G.P., Crane, P.K., Rogaeva, E., Barmada, M.M., Demirci, F.Y., Cruchaga, C., Kramer, P.L., Ertekin-Taner, N., Hardy, J., Graff-Radford, N.R., Green, R.C., Larson, E.B., St. George-Hyslop, P.H., Buxbaum, J.D., Evans, D.A., Schneider, J.A., Lunetta, K.L., Kamboh, M.I., Saykin, A.J., Reiman, E.M., DeJager, P.L., Bennett, D.A., Morris, J.C., Montine, T.J., Goate, A.M., Blacker, D., Tsuang, D.W., Hakonarson, H., Kukull, W.A., Foroud, T.M., Martin, E.R., Haines, J.L., Mayeux, R.P., Farrer, L.A., Schellenberg, G.D., Pericak-Vance, M.A., Alzheimer Disease Genetics Consortium, Albert, M.S., Albin, R.L., Apostolova, L.G., Arnold, S.E., Barber, R., Barnes, L.L., Beach, T.G., Becker, J.T., Beekly, D., Bigio, E.H., Bowen, J.D., Boxer, A., Burke, J.R., Cairns, N.J., Cantwell, L.B., Cao, C., Carlson, C.S., Carney, R.M., Carrasquillo, M.M., Carroll, S.L., Chui, H.C., Clark, D.G., Corneveaux, J., Cribbs, D.H., Crocco, E.A., DeCarli, C., DeKosky, S.T. et al. Effects of multiple genetic loci on age at onset in late-onset Alzheimer disease: A genome-wide association study. *JAMA Neurology* 71:1394-1404, 2014.

In Press

Wang, X., Lopez, O.L., Sweet, R.A., Becker, J.T., DeKosky, S.T., Barmada, M.M., Demirci, F.Y. and Kamboh, M.I. Genetic determinants of disease progression in Alzheimer's disease. *J Alzheimers Dis*, 2014 [In Press].

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Pivtoraiko, V.N., Abrahamson, E.E., Leurgans, S.E., DeKosky, S.T., Mufson, E.J. and Ikonomovic, M.D. Cortical pyroglutamate amyloid-beta levels and cognitive decline in Alzheimer's disease. *Neurobiology of Aging*, 2014 [In Press].

DeKosky, S.T. The role of big data in understanding late-life cognitive decline: E unum, pluribus. *JAMA Neurology*, 2014 [In Press].

Submitted

Palta, P., Golden, S.H., Crum, R.M., Colantuoni, E., Sharrett, A.R., Yasar, S., Nahin, R., DeKosky, S.T., Snitz, B., Williamson, J.D., Furberg, C.D., Rapp, S.R. and Carlson, M.C. Patterns of cognitive decline in the presence and absence of diabetes and hypertension. *Neurology*, 2014 [Submitted].

Palta, P., Carlson, M.C., Crum, R.M., Colantuoni, E., Sharrett, A.R., Yasar, S., Nahin, R., DeKosky, S.T., Snitz, B., Williamson, J.D., Furberg, C.D., Rapp, S.R. and Golden, S.H. Diabetes and cognitive decline in older adults: Ginkgo Evaluation of Memory Study. *Neurology*, 2014 [Submitted].

BOOK CHAPTERS/EDITED VOLUMES

DeKosky, S.T.: Recovery of function in senile dementia of the Alzheimer type. In Scheff, S.W. (ed.): *Aging and Recovery of Function in the Central Nervous System*. New York Plenum Press, 1984, 207-217.

Scheff, S.W., Anderson, K., and DeKosky, S.T.: Morphological aspects of brain damage in aging. In Scheff, S.W. (ed.): *Aging and Recovery of Function in the Central Nervous System*. New York: Plenum Press, 1984, 57-85.

DeKosky, S.T. The Dementias. In: *Current Diagnosis*. Eighth Edition. R. Conn, Editor. Philadelphia: Saunders, 1991, 957-969.

DeKosky, S.T. Mental status changes in dementia patients. In: *Emergent and Urgent Neurology*. W. J. Weiner, Editor. Philadelphia: Lippincott, 1991, 389-396

DeKosky, S.T. Pause and promise: Dementia in the 21st Century. In: *Handbook of Dementing Illnesses*. J. Morris, Editor. New York: Dekker, Inc., 1994, 613-626.

ZeKosky, S.T. and Palmer, A. Neurochemistry of aging. In: *Clinical Neurology of Aging*. Second Edition. M. Albert, J. Knoefel, Editors. New York: Oxford Press, 1994, 79-101.

DeKosky, S.T., Styren, S.D., and O'Malley, M.E. Cholinergic changes and synaptic alterations in Alzheimer's Disease. In: *Alzheimer Disease: Therapeutic Strategies*. E. Giacobini, R. Becker, Editors. Cambridge: Birkhauser, 1994, 93-96.

DeKosky, S.T. Advances in the Biology of Alzheimer's Disease. In: *The Dementias: Diagnosis and Management*. Second Edition. M.F. Weiner, Editor. Washington, DC: American Psychiatric Press, 1996, 313-330.

Forbes, M.L., Hendrich, K.S., Schidling, J.K., Williams, D.S., Ho, C., DeKosky, S.T., Marion, D.W., and Kochanek, P.M. Perfusion MRI assessment of cerebral blood flow and CO₂ reactivity after controlled cortical impact in rats. In: *Advances in Experimental Biology and Medicine, Oxygen Transport to Tissue XVIII*. E.M. Nemoto and J.C. LaManna, Editors. New York: Plenum Press, 411:7-12, 1997.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

Kochanek, P.M., Clark, R.S.B., Carlos, T.M., Carcillo, J.A., Whalen, M.J., Bell, M.J., Adelson, P.D., Marion, D.W., and DeKosky, S.T. Role of Inflammation after Severe Head Injury. In: *Critical Care State of the Art*. D. Porembka, Editor. Anaheim, CA: Society of Critical Care Medicine, 119-134, 1997.

Palmer, A.M. and DeKosky, S.T. The neurochemistry of ageing. In: *Principles and Practice of Geriatric Medicine, 3rd Edition*. M.S.J. Pathy, Editor. Chichester, England: John Wiley & Sons Ltd. 1998, 65-76, 1998.

Kochanek, P.M., DeKosky, S.T., Carlos, T., Clark, R.S.B., and Whalen, M. Inflammatory process in the pathobiology of secondary damage after traumatic brain injury. In: *Shock, Sepsis, and Organ Failure: Brain Damage Secondary to Hemorrhagic-Traumatic Shock, Sepsis, and Traumatic Brain Injury*. G. Schlag, H. Redl, and D. Traber, Editors. Berlin: Springer-Verlag, 1998, 197-213.

DeKosky, S.T. and Mulsant, B.H. Alzheimer's disease and other dementing disorders. In: *Emergent and Urgent Neurology, Second Edition*. W.J. Weiner and L.M. Shulman, Editors. 455-463, 1999.

Kaufer, D.I. and DeKosky, S.T. Diagnostic classifications: Relationship to the neurobiology of dementia. In: *Neurobiology of Mental Illness*. D.S. Charney, E.J. Nestler, and B.S. Bunney, Editors. New York: Oxford University Press, 641-649, 1999.

DeKosky, S.T. (Editor) *Dementia, Neurologic Clinics*. New York: W.B. Saunders. 2000.

DeKosky, S.T. Epidemiology and pathophysiology of Alzheimer's disease. In: *Clinical Cornerstone*. M. Quan, Editor. Belle Mead, NJ: Excerpta Medica, 15-26, 2001.

Kerr, M., DeKosky, S., Kay, A., and Marion, D. Role of genetic background: Influence of apolipoprotein genotype in Alzheimer's disease and after head injury. In: *Brain Injury*. R.S.B. Clark and P. Kochanek, Editors. Norwell, MA: Kluwer Academic Publishers, 317-347, 2001.

Kochanek, P.M., Whalen, M.J., Carlos, T.M., Clark, R.S.B., Dixon, C.E., DeKosky, S.T., and Marion, D.W. The inflammatory response as a therapeutic target in traumatic brain injury. In: *Head Trauma: Basic, Preclinical and Clinical Directions*. L. P. Miller and R.L. Hayes, Editors. New York: John Wiley & Sons, Inc., 189-202, 2001.

Lopez, O.L. and DeKosky, S.T. Neurobiology of Alzheimer's disease. In: *The Handbook of Medical Psychiatry*, S. Gershon and J. Soares, Editors. New York: Marcel Dekker, Inc., 537-552, 2003.

DeKosky, S.T., Kaufer, D.I. and Lopez, O.L. The dementias. In: *Neurology in Clinical Practice, 4th Edition*. W.G. Bradley, R.B. Daroff, G.M. Fenichel, and J. Jankovic, Editors. Philadelphia: Butterworth Heinemann, 1901-1951, 2004.

Kaufer, D.I. and DeKosky, S.T. Diagnostic classifications: Relationship to the neurobiology of dementia. In: *Neurobiology of Mental Illness, 2nd Edition*. D.S. Charney, E.J. Nestler, and B.S. Bunney, Editors. New York: Oxford University Press, 771-782, 2004.

Vellas, B. and DeKosky, S. Consensus on preventive trials on Alzheimer's disease. In: *Research and Practice in Alzheimer's Disease, Vol. 10*. B. Vellas, B. Windblad, M. Grundman, L.J. Fitten, H. Feldman, E. Giacobini and A. Kurz, Editors. Paris: Serdi Publisher, 47-58, 2005.

DeKosky, S.T., Ikonomovic, M.D., Hamilton, R.L., Bennett, D.A., and Mufson, E.J. Neuropathology of mild cognitive impairment in the elderly. In: *Alzheimer's Disease and Related Disorders Annual, Vol. 5*. S. Gauthier, P. Scheltens and J.L. Cummings, Editors. Boca Raton, FL, 1-16, 2005.

Ikonomovic, M.D., Abrahamson, E.E., Isanski, B.A., Debnath, M.L., Mathis, C.A., DeKosky, S.T., and Klunk, W.E. X-34 labeling of abnormal protein aggregates during the progression of Alzheimer's disease. In: *Meth Enzymol. Amyloid, Prions, & Other Protein Aggregates, Vol. 9*. R. Wetzel and I. Kheterpa, Editors. San Diego: Elsevier Inc., 123-144, 2006.

11/29/2014

CURRICULUM VITAE
STEVEN T. De KOSKY, M.D.

DeKosky, S.T., Kaufer, D.I., Hamilton, R.L., Wolk, D.A., and Lopez, O.L. The dementias. In: *Neurology in Clinical Practice, 5th Edition*. W.G. Bradley, R.B. Daroff, G.M. Fenichel, and J. Jankovic, Editors. Philadelphia: Butterworth Heinemann Elsevier, 1855-1907, 2008.

Lopez, O.L. and DeKosky, S.T. Clinical Symptoms in Alzheimer's Disease. In: *Handbook of Clinical Neurology: Dementia*. C. Duyckaerts and I. Litvan, Editors. Amsterdam, the Netherlands: Elsevier, 207-216, 2008.
Kaufer, D.I. and DeKosky, S.T. Diagnostic classifications: Relationship to the neurobiology of dementia. In: *Neurobiology of Mental Illness, 3rd Edition*. D.S. Charney and E.J. Nestler, Editors. New York: Oxford University Press, 895-907, 2009.

Apostolova, A., DeKosky, S.T. and Cummings, J.L. The dementias. In: *Bradley's Neurology in Clinical Practice Volume II. Neurological Disorders Sixth Edition*. R.B. Daroff, J.M. Fenichel, J. Jankovic and J.C. Mazziotta, Editors. New York: Elsevier, 1534-1582, 2012.

Ikonomovic, M.D. and DeKosky, S.T. Alzheimer's Disease. In: *Metabolism of Human Diseases: Organ Physiology and Pathophysiology*. Eckhard Lammert and Martin Zeeb, Editors. New York: Springer, 2013 [In Press]

DeKosky, S.T., and Asthana, S. (editors) *Handbook of Clinical Neurology: Geriatric Neurology*. Aminoff, M., Swaab, R., and Boller, F. (series editors) Amsterdam, the Netherlands: Elsevier, In Preparation.

ABSTRACTS AND PRESENTATIONS

Available upon request

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA

IN RE: NATIONAL FOOTBALL LEAGUE
PLAYERS' CONCUSSION INJURY
LITIGATION

No. 2:12-md-02323-AB
MDL No. 2323

Kevin Turner and Shawn Wooden,
*on behalf of themselves and
others similarly situated,*

Plaintiffs,

v.

National Football League and
NFL Properties, LLC,
successor-in-interest to
NFL Properties, Inc.,

Defendants.

Civil Action No. 2:14-cv-00029-AB

THIS DOCUMENT RELATES TO:
ALL ACTIONS

DECLARATION OF DR. WAYNE GORDON

Wayne Gordon, Ph.D.. affirms under penalty of perjury the truth of the following facts:

1. I am the Jack Nash Professor and Vice Chair of the Department of Rehabilitation Medicine of the Icahn School of Medicine at Mount Sinai. My *curriculum vitae* is attached as Exhibit A.
2. I have been asked to submit this declaration in support of the objection to the proposed class action settlement in the above captioned case filed by the MoloLamken LLP law firm. I am not being compensated for my work in doing so.

3. Chronic traumatic encephalopathy (or CTE) is a unique neurodegenerative disease that is known to exist outside of ALS, Alzheimer's disease, or Parkinson's disease.

4. Repetitive brain trauma is a necessary condition for developing CTE.

5. ALS, Alzheimer's disease, and Parkinson's disease are found in the general population of individuals who have not suffered repetitive brain trauma. Suicidality does not present as a symptom of these diseases.

6. Mood and behavioral impairments such as depression, suicidality, hopelessness, impulsivity, explosiveness, rage, and aggression, although present in the general population, appear more frequently in individuals suffering from CTE than in the general population.

7. The mood and behavioral impairments associated with CTE can present prior to the onset of CTE-related dementia and can be the cause of significant disability and distress for the patient.

8. Based on my experience and knowledge of the clinical and scientific literature, I believe that a reliable, valid, and clinically accepted diagnosis of CTE in living persons and based in part on objective biomarkers, will likely be available in the next decade, if not sooner, and long before the 65-year term of the proposed NFL Concussion Litigation Settlement expires.

9. I am not aware of the use of the diagnostic or classification categories of "Neurocognitive Impairment Level 1.0," "Neurocognitive Impairment Level 1.5," or "Neurocognitive Impairment Level 2.0" anywhere in the medical or scientific community. Further, there are many flaws in the cognitive assessment used to establish the nature and extent of cognitive impairment. For example:

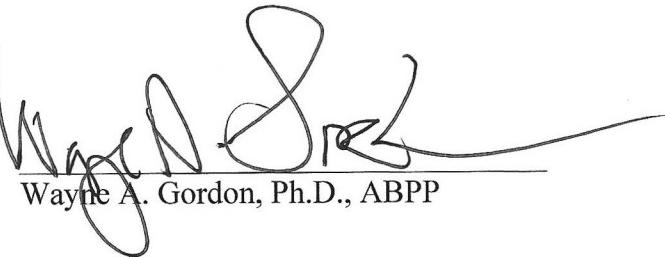
a. The Test of Pre-Morbid Function is used to establish baseline I.Q. This test is a word reading test that penalizes those who speak with a dialect or do not have

fluency in English. It also does not account for those whose non-verbal abilities are superior to their verbal abilities.

- b. The cognitive domain most frequently raised in the assessment is malingering. Malingering is not a domain of cognitive function nor /has it been associated with the onset of CTE.
- c. The gradations of impairment used to assign benefits are flawed as a person needs to be impaired in multi-domains of cognitive function. The assessment therefore neglects the fact that a person can suffer from a severe memory impairment, not have additional cognitive impairments and may be unable to perform simple day-to-day functions.
- d. The test battery includes the MMPI which is a measure of personality function, not cognitive function. Such a measure plays no role in cognitive assessment and has not been related to CTE.
- e. The criteria for compensation are solely dependent on the results of cognitive testing rather than viewing such assessments as one source of information that would be provided to a panel of experts who would include other sources of information in making a determination of eligibility, such as concussion history, medical history, and reports of significant others.

Pursuant to 28 U.S.C. § 1746, I state under penalty of perjury that the foregoing is true and correct.

Dated: November 30,, 2014



Wayne A. Gordon, Ph.D., ABPP

Exhibit A

CURRICULUM VITAE

NAME: Wayne A. Gordon

MAILING ADDRESS: Icahn School of Medicine at Mount Sinai
Department of Rehabilitation Medicine
3 East 101st Street, Room 118
New York, NY 10029-6574

TELEPHONE: (212) 824-8372

FAX: (212) 348-5901

E-MAIL: wayne.gordon@mssm.edu

PLACE OF BIRTH: New York, New York

CITIZENSHIP: United States of America

EDUCATION:

1967-1972	Ph.D., Ferkauf Graduate School of Education, Yeshiva University, New York City (Educational Psychology, School Psychological Services)
1966-1967	New School for Social Research, New York City (Psychology Masters degree program)
1962-1966	B.A. with honors, New York University, University Heights, New York City (History)

LICENSURE: 1973, New York State License No. 4204 (Psychology)

HONORS:

2011	Gold Key Award, American Congress of Rehabilitation Medicine
2010	William Fields Caveness Award, Brain Injury Association of America
2009	Department of Defense "Blue Ribbon" Panel on TBI and PTSD, Psychological Treatment
2009	Robert L. Moody Prize for Distinguished Initiatives in Brain Injury Research and Rehabilitation
2008	Partnership Award, The National Association of State Head Injury Administrators
2007	Fellow, American Congress of Rehabilitation Medicine
2006	Special Recognition Award, National Association of Rehabilitation Research and Training Centers
1996	Recognition Award, New York State Department of Health
1996	Fellow, Division of Health Psychology (Division 38), Congressman Ted Weiss Advocacy Award, New York State
1994	

1993	Fellow, Division of Rehabilitation Psychology (Division 22), American Psychological Association
1992	Roger Barker Distinguished Research Award, Division of Rehabilitation Psychology (Division 22), American Psychological Association
1986	Sidney Licht Award for Scientific Writing, America Congress of Rehabilitation Medicine (for Gordon, W., et al.) [1985]. Perceptual remediation in patients with right brain damage. <i>Archives of Physical Medicine and Rehabilitation</i> , 66, 353-359)
1985	Diplomate in Clinical Neuropsychology, American Board of Professional Psychology, American Board of Clinical Neuropsychology
1983	<i>Who's Who in Frontiers in Science and Technology</i>
1976-1986	<i>Who's Who in the East</i>
1975	Accredited by National Registry of Health Service Providers in Psychology

ACADEMIC APPOINTMENTS:

2011-Present	Vice Chair, Department of Rehabilitation Medicine, Mount Sinai School of Medicine
2010-Present	Co-Director, Mount Sinai NFL Center for Neurological Care, Mount Sinai Medical Center
2004-present	Jack Nash Professor, Department of Rehabilitation Medicine, Mount Sinai School of Medicine
1991-present	Professor of Rehabilitation Medicine and Psychiatry; Associate Director, Chief Psychologist and Co-Director of Research, Department of Rehabilitation Medicine; Mount Sinai Medical Center
1986-1991	Associate Professor of Rehabilitation Medicine and Psychiatry; Associate Director, Chief Psychologist and Co-Director of Research, Department of Rehabilitation Medicine; Mount Sinai Medical Center
1984-1986	Assistant Professor of Clinical Rehabilitation Medicine; Assistant Director of Behavioral Sciences/Psychological Services, Rusk Institute of Rehabilitation Medicine; New York University Medical Center
1975-1984	Assistant Clinical Professor of Rehabilitation Medicine; Supervisor of Research in the Behavioral Sciences, Rusk Institute of Rehabilitation Medicine; New York University Medical Center
1972-1975	Senior Clinical Research Psychologist, Department of Behavioral Sciences, Rusk Institute of Rehabilitation Medicine, New York University Medical Center
1970-1972	Clinical Research Psychologist, Department of Behavioral Sciences, Rusk Institute of Rehabilitation Medicine, New York University Medical Center

1967-1970	Research Assistant, Department of Behavioral Sciences, Rusk Institute of Rehabilitation Medicine, New York University Medical Center
1965-1967	Laboratory Assistant, Cardiovascular Research, Rusk Institute of Rehabilitation Medicine, New York University Medical Center

HOSPITAL APPOINTMENTS:

1992-present	Attending Psychologist, Mount Sinai Hospital
1986-1991	Associate Attending Psychologist, Mount Sinai Hospital

PROFESSIONAL SOCIETIES:

American Psychological Association (Divisions 22, 38, 40)
 International Neuropsychology Society
 American Congress of Rehabilitation Medicine
 Society of Behavioral Medicine
 Academy of Behavioral Medicine Research (Fellow)
 American Board of Professional Psychology
 American Spinal Injury Association (Associate)
 Association of Academic Physiatrists (Associate)

BOARD MEMBERSHIPS:

2010-2013	Treasurer, American Congress of Rehabilitation Medicine
2009-2010	Past President, American Congress of Rehabilitation Medicine
2008-present	Member, Medical Advisory Board Brain Trauma Foundation
2008-present	Member, Medical Advisory Board Sarah Jane Brain Foundation
2008-present	Chair, Research Council Brain Injury Association of America
2008-present	Advisor, BrainLine
2008-2009	President, American Congress of Rehabilitation Medicine
2008	Chair CDMRP Peer Review Panel on PTSD
2007-present	Member of the Executive Committee, National Association of Rehabilitation Research and Training Centers
2007-present	Board Member, Ontario Neurotrauma Foundation
2007-2008	President Elect, American Congress of Rehabilitation Medicine
2006-2007	Vice President, American Congress of Rehabilitation Medicine
2005-2008	Vice Chair, Board of Brain Injury Association of America
2004-2006	Board Member, American Congress of Rehabilitation Medicine
2004-2006	President, National Association of Rehabilitation Research and Training Centers
2002-2007	Member of the Executive Committee National Association of Rehabilitation Research and Training Centers
2002-2005	Board Member, Brain Injury Association of America
1999	Member, Program Committee International Neuropsychological Society

GRANT SUPPORT:

Psychological and Educational Studies with Spina Bifida Children; U.S. Office of Education, Grant No. 32-42-8145-5020, 1965-1968; Leonard Diller, Principal Investigator

Studies in Cognition and Rehabilitation in Hemiplegia; Social and Rehabilitation Service, RD-2666-P, 1967-1970; Leonard Diller, Principal Investigator

Response Patterns in Brain Damaged Children and Teaching Styles; U.S. Office of Education, Grant No. OEG-0-70-3361, and the Easter Seal Society, 1970-1973; Wayne A. Gordon, Co-Principal Investigator

Further Studies in the Remediation of Brain Damage; National Institutes of Health (NINCDS), Grant No. NS10236-01-10, 1972-1982; Leonard Diller, Principal Investigator; Wayne A. Gordon, Co-Principal Investigator

Demonstration of Benefits of Early Identification of Psychological Problems and Early Intervention Toward Rehabilitation of Cancer Patients; National Institutes of Health (NCI), Grant No. N01-CN-55188, 1975-1979; Leonard Diller, Principal Investigator; Wayne A. Gordon, Co-Principal Investigator

Mental Health Research and Evaluation Rehabilitation; National Institute of Mental Health, Grant No. 732-MH14282, 1975-1978; Leonard Diller, Principal Investigator

Rehabilitation Indicators: Field Test; National Institute for Handicapped Research, Grant No. 12-P-59047, 1977-1982; Leonard Diller, Principal Investigator

Psychological Adjustment and Characteristics in Recent Spinal Cord Injuries; National Institute for Handicapped Research, Grant No. 13-P-59127, 1977-1981; Wayne A. Gordon, Principal Investigator

Year-round Work Experience for Disabled Students in the Business Sector; Department of Labor, Youthwork Incorporated, Grant No. 02325, 1980-1982; Rosalind Zuger, Principal Investigator

New York Regional Spinal Cord Injury Model System; National Institute for Handicapped Research, Grant No. 13-P-55868/08, 1980-1986; Kristjan T. Ragnarsson, Principal Investigator

Activity Patterns of Normal and Physically Disabled Children and Their Families; William T. Grant Foundation, Grant No. 81075181, 1981-1986; Wayne A. Gordon, Principal Investigator

Research and Training Center on Head Trauma and Stroke; National Institute for Handicapped Research, Grant No. G00830039, 1983-1986; Wayne A. Gordon, Co-Principal Investigator

Model Family-Professional Partnership Interventions for Childhood Traumatic Brain Injury Survivors; U.S. Department of Education, National Institute for Disability and Rehabilitation Research, Grant No. H133A80023, 1989-1991; Wayne A. Gordon, Co-Principal Investigator

Treatment of Affective Deficits in Stroke Rehabilitation; National Institutes of Health, Grant No. NS24608, 1985-1991; Wayne A. Gordon, Principal Investigator

Traumatic Brain Injury Model System; U.S. Department of Education, National Institute for Disability and Rehabilitation Research, Grant No. G0087C201888, 1987-1992; Wayne A. Gordon, Co-Principal Investigator

Mount Sinai Spinal Cord Injury Model System; U.S. Department of Education, National Institute for Disability and Rehabilitation Research, Grant No. H133N00009, 1990-1995; Wayne A. Gordon, Co-Principal Investigator

Comprehensive Regional Traumatic Brain Injury Rehabilitation and Prevention Center (CR-TBI-RPC); U.S. Department of Education, Grant No. H128A00022, 1990-1994; Wayne A. Gordon, Principal Investigator

Research and Training Center on Community Integration of Individuals with Traumatic Brain Injury; U.S. Department of Education, National Institute for Disability and Rehabilitation Research, Grant No. H133B30038, 1993-1998; H133B980013, 1998-2004; Wayne A. Gordon, Principal Investigator

Traumatic Brain Injury Technical Assistance Project; New York State Department of Education, 1995-2000; Wayne A. Gordon, Principal Investigator

Training Personnel for the Education of Individuals with Disabilities; U.S. Department of Education, National Institute on Disability and Rehabilitation Research, Grant No. H029A60013, 1996-1999; Wayne A. Gordon, Principal Investigator

Evaluation of a Mentoring Program for Individuals with Brain Injury and their Families, Langeloth Foundation, 2000-2004; Wayne A. Gordon, Principal Investigator.

Mount Sinai Traumatic Brain Injury Model System of Care, U.S. Department of Education, National Institute on Disability and Rehabilitation Research, Grant No. H133A020501, 2002-2007; Wayne A. Gordon, Principal Investigator

Research and Training Center on Traumatic Brain Injury Interventions, U.S. Department of Education, National Institute on Disability and Rehabilitation Research, Grant No. H133B040033, 2004-2010; Wayne A. Gordon, Principal Investigator

Mount Sinai Injury Control Research Center, Centers for Disease Control and Prevention (CDC). Grant No. 1R49CE001171-01, 2007-2012; Wayne A. Gordon, Principal Investigator.

The New York Traumatic Brain Injury Model System, U.S. Department of Education, National Institute on Disability and Rehabilitation Research. Grant No. H133A070033, 2007-2012; Wayne A. Gordon, Principal Investigator.

Transforming TBI Research and Clinical Care, National Institute of Neurological Disorder and Stroke (NIH-NINDS), Grant No. 1RC2NS069409, 2009-2011; Wayne A. Gordon, Principal Investigator.

Mount Sinai Injury Control Research Center, Centers for Disease Control and Prevention (CDC). Grant No. 1R49CE002092-01, 2012-2017; Wayne A. Gordon, Principal Investigator.

The New York Traumatic Brain Injury Model System, U.S. Department of Education, National Institute on Disability and Rehabilitation Research. Grant No. H133A120084, 2012-2017; Wayne A. Gordon, Principal Investigator.

Neuropathology of CTE and Delayed Effects of TBI: Toward In-Vivo Diagnostics. National Institute of Health, Grant No. 11397022, 2013-2017; Wayne A. Gordon, Principal Investigator.

TEACHING EXPERIENCE:

OTHER:

Doctoral Committees

Student: Judith R. Gold (New York University, Counseling Psychology)

Title of Thesis: The relationships among selected personality characteristics, activity patterns of adjustment, and manner of onset of spinal cord injury

Student: Mary R. Hibbard (New York University, Counseling Psychology)
Title of Thesis: Affective impairments in right brain damaged individuals
Student: Carrie Gelber (Pace University, Psychology)
Title of Thesis: The relationship of development and Other psychosocial variables to the ability to adjust to a spinal cord injury
Student: Joseph Weinberg (New York University, Educational Psychology)
Title of Thesis: Impairments of mental rotation in right brain damaged individuals
Student: Ruth Jonas (New School for Social Research)
Title of Thesis: The relationship between the Type A behavior pattern and the expression of hostility

Peer Review Activities

National Institutes of Health

Consultant, Epidemiology and Disease Control Study Section, NIH, 1976-1977
Member, Special Study Section on the Psychological Precursors to Cancer, NCI, NIH, 1977
Member, Behavioral Medicine Study Section, NIH, 1976-1980
Co-Chair, Review Panel for Multi-purpose Arthritis Centers, NIAMDD, 1979-1980
Member, NIH Task Force on Medical Rehabilitation Research, 1990
Member, Rehabilitation Medicine Research Review Committee, NIH, 1996-1999

National Institute on Disability and Rehabilitation Research

Reviewer, Field Initiated Studies, Research and Demonstration Grants, Innovative Grants, and Research Training Grants, 1985 - present
Reviewer, Rehabilitation Research and Training Centers, 1993

Veterans Administration

Consultant, VA Merit Review, 1987 – present

Center for Disease Control and Injury Prevention (CDC)

Reviewer, Injury Control Research Centers – 2004, 2008

Consultation

Consultant, National Exercise and Heart Disease Project, Social and Rehabilitation Services, Department of Health, Education and Welfare, 1972-1973
Member, Field Testing Task Force, Rehabilitation Indicators Project, Rehabilitation Services Administration, DHEW, 1974-1977
Member, Technical Assistance Group on Weighted Case Closures, Arkansas Rehabilitation Research and Training Center, 1977
Ad-Hoc reviewer, VA Cooperative Studies Program, 1979
Consultant, Brooklyn VA Medical Center, Psychology Service, 1979-1981
Member, In-House Grant Review Committee, Rusk Institute of Rehabilitation Medicine, 1975-1978
Advisory Board member, National Council on the Handicapped, Needs Survey of Disabled Americans, 1985

Advisory Board member, sponsored by the "Needs Assessment of Individuals with Cancer," State of Pennsylvania Department of Health, 1984 - 1986
 Program evaluation consultant, Post-Institutionalization Placement Program, United Cerebral Palsy of New York State, 1978-1985
 Co-chair, Technical Advisory Group on Traumatic Brain Injury Rehabilitation, New York State Department of Health, 1992-1993
 Consultant, U.S. Department of Education, Office of Special Education and Rehabilitative Services, Re-inventing Government, 1994
 Chair, Managed Care Task Force, Brain Injury Association, 1996
 Consultant, SmithKline and Beecham Pharmaceuticals, 1996
 Consultant, Behavioral and Social Science Review Integration, NIH, 1998
 Department of Defense Center for Psychological Health and Traumatic Brain Injury Advisory Panel on Cognitive Rehabilitation 2009
 Department of Defense Blue Ribbon Panel on Traumatic Brain Injury and Post Traumatic Stress Disorder 2009
 Consultant, American Academy of Emergency Physicians, Development of Patient Information Following Mild TBI 2009

Journals

Editorial Board

Archives of Physical Medicine and Rehabilitation (1988-1992)
Neuropsychology Review (1986-1995)
NeuroRehabilitation (1988-1995)
Journal of Head Trauma Rehabilitation (1992-1999)
Journal of Spinal Cord Injury Rehabilitation (1995-2001)
Rehabilitation Process and Outcome (Present)

Reviewer

Journal of Behavioral Medicine
Archives of Physical Medicine and Rehabilitation
Journal of Clinical and Consulting Psychology
Psychosomatic Medicine
Health Psychology and Medical Care
Neuropsychology
Neuropsychiatry, Neuropsychology and Behavioral Neurology
Journal of Head Trauma Rehabilitation

Mount Sinai Medical Center Committees

Member, Search Committee for Chief, Rehabilitation Medicine Service, City Hospital Center at Elmhurst, 1988
 Member, Faculty Council, Mount Sinai School of Medicine, 1989-1993
 Member, Search Committee for Chair, Department of Neurology, Mount Sinai Medical Center, 1989-1990; 1993
 Member, Search Committee for Chair, Department of Geriatrics and Adult Development, Mount Sinai Medical Center, 1993-1994

Chair, Appointments and Promotions Committee, Department of Rehabilitation Medicine,
Mount Sinai Medical Center, 1986- present
Chair, Ethics in Research Committee, Mount Sinai Medical Center, 1996

Other Committees

Chair, Liaison Committee, Division 22 (Rehabilitation Psychology) of the American Psychological Association, 1978-1979
 Chair, Research Committee, National Association of Rehabilitation Research and Training Centers, 1983-1985
 Member, Joint Committee on Functional Assessment, American Spinal Injury Association and the Spinal Cord Injury Model Care System, 1984-1987
 Member, Task Force on the Establishment of a Uniform National Database, American Congress of Rehabilitation Medicine, 1984-present
 Member, Research Committee, American Congress of Rehabilitation Medicine, 1985-1992
 Chair, Psychology Interest Group, American Congress of Rehabilitation Medicine, 1993-1994
 Member, Task Force on Federal Government Cooperative Agreements, National Head Injury Foundation, 1985
 Member, Essay Awards Committee, American Congress of Rehabilitation Medicine, 1984-present
 Member, Provider Council and Advisory Board, New York State Head Injury Association, 1987- 1990
 Member, Research Committee, National Head Injury Foundation, 1987-present
 Member, Awards Committee, National Head Injury Foundation, 1993-present
 Participant, NIDRR/OSERS National Invitational Conference on Traumatic Brain Injury Research, November, 1987
 Member, Program Committee, International Neuropsychology Society, 1988
 Chair, Technical Advisory Group on Traumatic Brain Injury Rehabilitation, New York State Department of Health, 1992-1993
 Chair, Psychology Interest Group, American Congress of Rehabilitation Medicine, 1994-1995
 Member, New York State Head Injury Services Coordinating Council, NYS Department of Health, 1993-1994
 Member, Planning and Program Committee, Conference on TBI, U.S. Department of Education, 1994
 Member, Institute of Medicine Committee on Traumatic Brain Injury, 2005
 Member, Advisory Committee on Traumatic Brain Injury National Statistical and Data Center, Craig Hospital, 2006-present
 Member, International Advisory Group – Ontario Neurotrauma Foundation (Inpatient Rehabilitation, 2007; Mild TBI, 2010; TBI in the Elderly, 2011)
 Co-Chair, Third Interagency Conference on TBI, 2009-2011.

PUBLICATIONS:

Peer-Reviewed Articles

1. Ben-Yishay, Y., Diller, L., Gerstman, L., & Gordon, W. (1970). Relationship between initial competence and ability to profit from cues in brain damaged individuals. *Journal of Abnormal Psychology*, 75, 248-259.

2. Ben-Yishay, Y., Diller, L., Mandelberg, I., Gordon, W., & Gerstman, L. (1971). Similarities and differences in block design performance between older-normal and brain injured persons: A task analysis. *Journal of Abnormal Psychology, 78*, 17-25.
3. Dembo, T., Diller, L., Gordon, W., & Sherr, R. (1973). A view of rehabilitation psychology. *American Psychologist, 28*, 719-722.
4. Ben-Yishay, Y., Diller, L., Mandelberg, I., Gordon, W., & Gerstman, L.J. (1974). Differences in matching persistence behavior during block design performance between older normal and brain damaged persons: A process analysis. *Cortex, 10*, 121-347.
5. Gordon, W., Gertler, M.M., Diller, L., Leetma, H., & Gerstman, L.J. (1974). Behavioral correlates of the coronary profile. *Journal of Clinical Psychology, 34*3-347.
6. Diller, L., Gordon, W.A., Hanesian, H., et al. (1977). Final Report, U.S. Office of Education, Grant #0-70-3367. Response patterns in brain damaged children and teaching styles. *Journal Supplement Abstract Service, 7*, (Ms. No. 1543).
7. Weinberg, J., Diller, L., Gordon, W.A., Gerstman, L.J., Lieberman, A., Lakin, P., Hodges, G., & Ezrachi, O. (1977). Visual scanning training effect on reading-related tasks in acquired right brain damage. *Archives of Physical Medicine and Rehabilitation, 58*, 479-486.
8. Weinberg, J., Diller, L., Gordon, W.A., Gerstman, L.J., Lieberman, A., Lakin, P., Hodges, G., & Ezrachi, O. (1979). Training sensory awareness and spatial organization in people with right brain damage. *Archives of Physical Medicine and Rehabilitation, 60*, 491-496.
9. Freidenbergs, I., Gordon, W.A., Diller, L., Hibbard, M., Levine, L., Wolf, C., & Lipkins, R. (1979). Psychological aspects of cancer: An annotated bibliography. *Journal Supplement Abstract Service, 9*, (Ms. #1890).
10. Freidenbergs, I., Gordon, W.A., Hibbard, M., & Diller, L. (1980). Assessment and treatment of psychosocial problems of the cancer patient: A case study. *Cancer Nursing, 3*, 111-119.
11. Gordon, W., Freidenbergs, I., Diller, L., Hibbard, M., Wolf, C., Levine, L., Lipkins, R., Ezrachi, O., & Lucido, D. (1980). The efficacy of psychosocial intervention with cancer patients. *Journal of Clinical and Consulting Psychology, 48*, 743-759.
12. Efthimiou, J., Gordon, W., Sell, G.H., & Stratford, C. (1981). Electronic assistive devices: The impact on the quality of life of high level quadriplegic persons. *Archives of Physical Medicine and Rehabilitation, 62*, 131- 134.
13. Freidenbergs, I., Gordon, W.A., Hibbard, M., Levine, L., Wolf, C., & Diller, L. (1981-1982). Psychosocial aspects of living with cancer: A review of the literature. *International Journal of Psychiatry in Medicine, 11*, 303-329.
14. O'Neill, J., Brown, M., Gordon, W., Schonhorn, R., & Greer, E. (1981). The activity patterns of mentally retarded adults in institutions and communities: A longitudinal study. *Applied Research in Mental Retardation, 2*, 367- 379.
15. Diller, L., & Gordon, W.A. (1981). Interventions for cognitive deficits in brain injured adults. *Journal of Consulting and Clinical Psychology, 49*, 822- 834.
16. Lieberman, A.N., Foo, S.H., Ransohoff, J., Wise, A., George, A., Gordon, W., & Walker, W. (1982). Long-term survival among patients with malignant brain tumors. *Neurosurgery, 10*, 450-453.
17. Weinberg, J., Piasetsky, E., Diller, L., & Gordon, W.A. (1982). Treating perceptual organization deficits in non-neglecting RBD stroke patients. *Journal of Clinical Neuropsychology, 4*, 59-75.

18. Gordon, W.A., Harasymiw, S., Bellile, S., Lehman, L., & Sherman, B. (1982). The relationship between pressure sores and adjustment in spinal cord injured individuals. *Rehabilitation Psychology*, 27, 185-191.
19. Brown, M., Diller, L., Gordon, W.A., Fordyce, W.E., & Jacobs, D.F. (1984). Rehabilitation indicators and program evaluation. *Rehabilitation Psychology*, 29, 21-35.
20. Ahn, J.H., Ragnarsson, K.T., Sell, G.H., Gordon, W.A., Lewin, H., & Goldfinger, G. (1984). Current trends in stabilizing high thoracic and thoraco-lumbar spinal fractures. *Archives of Physical Medicine and Rehabilitation*, 65, 356-359.
21. Glenn, M.B., Carfi, J., Belle, S.E., Ahn, J.H., Gordon, W.A., Myers, P.A., Miron-Bernstein, S., & Ragnarsson, K.T. (1985). Serum albumen as a predictor of course and outcome in a rehabilitation service. *Archives of Physical Medicine and Rehabilitation*, 66, 294-297.
22. Gordon, W.A., Hibbard, M., Egelko, S., Diller, L., Scotzin, M., Lieberman, A., & Ragnarsson, K.T. (1985). Perceptual remediation in patients with right brain damage: A comprehensive program. *Archives of Physical Medicine and Rehabilitation*, 66, 353-359.
23. O'Neill, J., Gordon, W.A., Brown, M., Schonhorn, R., & Buch, L. (1985). Impact of a community-based residence program on skill levels and patterns of activity of profoundly retarded individuals. *Applied Research in Mental Retardation*, 6, 363-371.
24. Brown, M., & Gordon, W.A. (1986). Rehabilitation indicators: A complement to traditional approaches to patient assessment. *Central Nervous System Trauma*, 3, 25-35.
25. Gordon, W.A. (1987). A brighter picture for stroke patients. *Mount Sinai Review*, 6, 13-17.
26. Brown, M., Gordon, W.A., & Ragnarsson, K.T. (1987). Unhandicapping the disabled: What is possible? *Archives of Physical Medicine and Rehabilitation*, 68, 206-219, 317. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1985, 66, 535.)
27. Gordon, W.A., & Hibbard, M.R. (1988). Recovering from brain injury. *Mount Sinai Review*, 7, 17-20.
28. Gordon, W.A., Hibbard, M.R., & Morganstein, S. (1988). Clinical forum: Response to Tanner and Gerstenberger. *Aphasiology*, 2, 85-88.
29. Brown, M. & Gordon, W.A. (1987). Impact of impairment on activity patterns of children. *Archives of Physical Medicine and Rehabilitation*, 68, 828-832. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1986, 67, 623).
30. Egelko, S., Gordon, W.A., Hibbard, M., Diller, L., Lieberman, A., Holliday, R., Ragnarsson, K., Shaver, M., & Orazem, J. (1988). The relationship between CT scans and neuropsychological test performance in right brain damaged stroke patients. *Journal of Clinical and Experimental Neuropsychology*, 10, 539-564. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1986, 67, 633.)
31. Kreutzer, J., Gordon, W.A., & Wehman, P. (1989). Cognitive remediation following traumatic brain injury. *Rehabilitation Psychology*, 34, 117-130.
32. Gordon, W.A., Hibbard, M.R., & Kreutzer, J. (1989) Cognitive remediation: Issues in research and practice. *Journal of Head Trauma Rehabilitation*, 4, 76-85.
33. Hibbard, M., Grober, S., Gordon, W.A., Aletta, E., & Freeman, A. (1990). Cognitive therapy and the treatment of post-stroke depression. *Topics in Geriatric Rehabilitation*, 5, 43-55.
34. Hibbard, M.R., Grober, S.E., Gordon, W.A., Aletta, E.G., & Freeman, A. (1990). Modification of cognitive psychotherapy for the treatment of post-stroke depression. *The Behavior Therapist*, 13, 15-17.

35. O'Neill, J., Brown, M., Gordon, W., Orazem, J., Hoffman, C., & Schonhorn, R. (1990). Medicaid versus state funding of community residences: Impact on daily life of people with mental retardation. *Mental Retardation*, 28, 183-188.
36. Gordon, W.A., Hibbard, M.R., Egelko, S., Riley, E., Simon, D., Diller, L., & Ross, E.D. (1991). Issues in the diagnosis of post-stroke depression. *Rehabilitation Psychology*, 36, 71-88.
37. Grober, S.E., Gordon, W.A., Sliwinski, M., Hibbard, M.R., Aletta, E.G., & Paddison, P.L. (1991). The utility of the dexamethasone suppression test in the diagnosis of post-stroke depression. *Archives of Physical Medicine and Rehabilitation*, 72, 1076-1079. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1989, 70, A-72).
38. Hibbard, M.R., Gordon, W.A., Stein, P.N., Grober, S., & Sliwinski, M.J. (1992). Awareness of disability in patients following stroke. *Rehabilitation Psychology*, 37, 103-120.
39. Stein, P.N., Gordon, W.A., Hibbard, M.R., & Sliwinski, M.J. (1992). An examination of depression in the spouses of stroke patients. *Rehabilitation Psychology*, 37, 121-130.
40. Raskin, S.R., & Gordon, W.A. (1992). The impact of different approaches to cognitive remediation on generalization. *NeuroRehabilitation*, 2, 38-45.
41. Waxman, R., & Gordon, W.A. (1992). Expanding applications of cognitive remediation: Acute rehabilitation units and low functioning patients. *NeuroRehabilitation*, 2, 46-54.
42. Atten, T., Braciszewski, T., Cicerone, K., Dahlberg, C., Evans, S., Fotto, M., Gordon, W.A., Halley, W., Harrington, D., Levin, W., Malec, J., Millis, S., Morris, J., Muir, C., Richen, J., Salazar, E., Schiavone, D., & Smigielski, J. (1992). Guidelines for cognitive rehabilitation. *NeuroRehabilitation*, 2, 62-67.
43. Ragnarsson, K.T., & Gordon, W.A. (1992). Rehabilitation after spinal cord injury: The team approach. *Physical Medicine and Rehabilitation Clinics of North America*, 3, 853-878.
44. Gordon, W.A., & Hibbard, M.R. (1992). Critical issues in cognitive remediation. *Neuropsychology*, 6, 361-370.
45. Hibbard, M.R., & Gordon, W.A. (1992). The comprehensive psychological assessment of stroke patients. *NeuroRehabilitation*, 2(4), 9-20.
46. Gordon, W.A., Mann, N., & Willer, B. (1993). Demographic and social characteristics of the traumatic brain injury model system database. *Journal of Head Trauma Rehabilitation*, 8(2), 26-33.
47. Hall, K., Hamilton, B., Gordon, W.A., & Zasler, N. (1993). Characteristics and comparisons of functional assessment indices: Disability Rating Scale, Functional Independence Measure and Functional Assessment Measure. *Journal of Head Trauma Rehabilitation*, 8(2), 60-74.
48. Lehmkuhl, D., Hall, K., Mann, N., & Gordon, W.A. (1993). Factors that influence the costs and length of stay of persons with traumatic brain injury in acute care and in rehabilitation. *Journal of Head Trauma Rehabilitation*, 8(2), 88-100.
49. Willer, B., Rosenthal, M., Kreutzer, J., Gordon, W.A., & Rempel, R. (1993). Assessment of community integration following rehabilitation for traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 8(2), 75-87.
50. Marks, M., Sliwinski, M., & Gordon, W.A. (1993). An examination of the needs of families with a brain-injured child. *NeuroRehabilitation*, 3(3), 1-12.
51. Gordon, W.A., & Lehmkuhl, D. (1993). Model systems of care for individuals with TBI. *American Rehabilitation*, 19, 24-28.

52. Ragnarsson, K.T., & Gordon, W.A. (1993). The model system of care concept and the role of the physiatrist. *Rehabilitation Management*, 33-46.
53. Milliren, J.W., & Gordon, W.A. (1994). The development of an integrated rehabilitation system for persons with traumatic brain injury: The evaluation of public policy in New York State. *Journal of Head Trauma Rehabilitation*, 9, 27-35.
54. High, W.J., Gordon, W.A., Lehmkuhl, D., Newton, N., Vandergoot, D., Thoi, L., & Courtney, L. (1995). Productivity and service utilization following traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 10, 64-80.
55. Stein, P.N., Sliwinski, M.J., Gordon, W.A., & Hibbard, M.R. (1996). The discriminative properties of somatic and non-somatic symptoms for post-stroke depression. *Journal of Clinical Neuropsychology*, 10, 142-48.
56. Gordon, W.A., & Hibbard, M. (1997). A review of post-stroke depression. *Archives of Physical Medicine and Rehabilitation*, 78, 658-663.
57. Mechanick, J.I., Pomerantz, F., Flanagan, S., Stein, A., Gordon, W.A., & Ragnarsson, K.T. (1997). Parathyroid suppression in spinal cord injury patient is associated with degree of neurologic impairment and not level of injury. *Archives of Physical Medicine and Rehabilitation*, 73, 692-696.
58. Gordon, W.A. & Brown, M. (1997). Community integration of persons with spinal cord injury. *American Rehabilitation*, 23, 11-14.
59. Shnek, Z., Foley, F., LaRocca, N., Gordon, W., DeLuca, J., Schwartzman, H., Halper, S., Lennox, S., & Irvine, J. (1997). Helplessness, self-efficacy cognitive distortions and depression in multiple sclerosis and spinal cord injury. *Annals of Behavioral Medicine*, 19, 289-294.
60. Hibbard, M.R., Uysal, S., Sliwinski, M., & Gordon, W.A. (1998). Undiagnosed health issues in individuals with traumatic brain injury in the community. *Journal of Head Trauma Rehabilitation*, 13(4), 47-57.
61. Gordon, W.A., Sliwinski, M., Echo, J., McLoughlin, M., Scheerer, & M., Meili, T. (1998). The benefits of exercise in individuals with TBI: A retrospective study. *Journal of Head Trauma Rehabilitation*, 13(4), 58-67.
62. Sliwinski, M., Gordon, W.A., & Bogdany, J. (1998). The beck depression inventory: Is it suitable measure of depression for individuals with traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 13(4), 40-46.
63. Gordon, W.A., Brown, M., Sliwinski, M., Hibbard, M., Patti, N., Weiss, M.J., Kalinsky, R., & Sheerer, M. (1998). The enigma of hidden TBI. *Journal of Head Trauma Rehabilitation*, 13, 39-56.
64. Brown, M., & Gordon, W.A. (1999). Quality of Life as a Construct in Health and Disability Research. *Mount Sinai Journal of Medicine*, 66, 160-169.
65. Reich, D.L., Uysal, S., Sliwinski, M., Ergin, M.A., Kahn, R.A., Konstadt, S.N., McCullough, J., Hibbard, M.R., Gordon, W.A., & Griep, R.B. (1999) Neuropsychological outcome following deep hypothermic circulatory arrest in adults. *Journal of Cardiothoracic and Vascular Surgery*, 117, 156-163.
66. Reich, D.L., Uysal, S., Bodian, C.A., Gabriele, S. Hibbard, M.H., Gordon, W.A. Sliwinski, M. & Kayne, R.D. (1999). The relationship of cognitive, personality, and academic measures to anesthesiology resident clinical performance. *Anesthesia and Analgesia*, 88, 1092-1100.

67. Pierce, C.A., Richards, S., Gordon, W.A., & Tate, D. (1999). Life satisfaction following spinal cord injury and the WHO model of functioning and disability. *SCI Psychosocial Process*, 12(4), 121, 123-127.
68. Brown, M., Gordon, W.A., & Haddad, L. (2000). Models for predicting subjective quality of life in individuals with traumatic brain injury. *Brain Injury*, 14(1), 5-19.
69. Gordon, W.A., Haddad, L., Brown, M., Hibbard, M.R. & M. Sliwinski (2000). The sensitivity and specificity and self-reported symptoms in individuals with traumatic brain injury. *Brain Injury*, 14(1), 21-33.
70. Hibbard, M.R., Bogdany, J., Uysal, S., Kepler, K., Silver, J.M., Gordon, W.A., & Haddad, L. (2000). Axis II pathology in individuals with traumatic brain injury. *Brain Injury*. 14(1), 45-61.
71. Jaffe, M.P., O'Neill, J., Vandergoot, D., Gordon, W.A., & Small, B. (2000). The unveiling of traumatic brain injury in an HIV/AIDS population. *Brain Injury*. 14(1), 35-44.
72. Hibbard, M.R., Gordon, W.A., Flanagan, S., Haddad, L., & Labinsky, E. (2000). Sexual dysfunction after traumatic brain injury. *NeuroRehabilitation*. 15, 107-120.
73. Richards, J.S., Bombardier, C.H., Tate, D.G., Dijkers, M., Gordon, W.A., Shewchuck, R., DeVico, M.J. (2000). Access to the environment and life satisfaction after spinal cord injury. *Archives of Physical Medicine and Rehabilitation*. 80(1), 1501-1506.
74. Dowler, R., Richards, J.S., Putske, J., Gordon, W.A., & Tate, D.G. (2000). Impact of demographic and medical factors on satisfaction with life after spinal cord injury: a normative study. *The Journal of Spinal Cord Medicine*. 24(2), 87-91.
75. Findler, M., Cantor, J.B., Haddad, L., Gordon, W.A., & Ashman, T. (2001). The reliability and validity of the SF-36 Health Survey Questionnaire for use with individuals with traumatic Brain injury. *Brain Injury*. 15(8), 715-723
76. Brown, M., Gordon, W.A., Spielman, L., & Haddad, L. (2002). Participation by individuals with spinal cord injury in social and recreational activity outside the home. *Topics in Spinal Cord Injury Rehabilitation*. 7(3), 83-100.
77. Hibbard, M.R., Cantor, J., Charatz, H., Rosenthal, R., Ashman, T., Gundersen, N., Ireland-Knight, L., Gordon, W.A., Avner, J., & Gartner, A. (2002). Peer support in the community: Initial findings of a mentoring program for individuals with traumatic brain injury and their families. *Journal of Head Trauma Rehabilitation*, 17(2), 112-131.
78. Brown, M., Gordon, W.A., & Spielman, L. (2003). Participation in social and recreational activity in the community by individuals with traumatic brain injury. *Rehabilitation Psychology*, 48(4), 266-274.
79. Ashman, T.A., Schwartz, M.E., Cantor, J.B., Hibbard, M.R. & Gordon, W.A. (2004). Screening for substance abuse in individuals with traumatic brain injury. *Brain Injury*, 18, 191-202.
80. Brown, M., & Gordon, W.A. (2004). Empowerment in measurement: 'Muscle', 'Voice' and subjective quality of life as a gold standard. *Archives of Physical Medicine and Rehabilitation*, 85(4), S13-S20.
81. Gordon, W.A., Cantor, J.B., Johanning, E., Charatz, H.J., Ashman, T.A., Breeze, J., Haddad, L., & Abramowitz, S. (2004). Cognitive impairments associated with toxigenic fungal exposure: A replication and extension of previous findings. *Applied Neuropsychology*, 11(2), 65-74.
82. Cantor, J.B., Gordon, W.A., Schwartz, M.E., Charatz, H.J., Ashman, T.A., & Abramowitz, S. (2004). Child and parent responses to a brain injury screening questionnaire. *Archives of Physical Medicine and Rehabilitation*, 85(4), S54-S60.

83. Ashman, T.A., Spielman, L.A., Hibbard, M.R., Silver, J.M., Chandna, T., & Gordon, W.A. (2004). Psychiatric challenges in the first 6 years after traumatic brain injury: Cross-sequential analyses of axis I disorders. *Archives of Physical Medicine and Rehabilitation*, 85(4), S36-S42.
84. Gordon, W.A. (2004). Introduction: Community Integration of Individuals with Traumatic Brain Injury. *Archives of Physical Medicine and Rehabilitation* 85(4), S1-S2.
85. Gordon, W.A., & Cantor, J.B. (2004). The diagnosis of cognitive impairment associated with exposure to mold. *Advances in Applied Microbiology* 55, 361-374.
86. Brown, M., Dijkers, M.P.J.M., Gordon, W.A., Ashman, T., Charatz, H., & Cheng, Z. (2004). Participation Objective, Participation Subjective: A measure of participation combining outsider and insider perspectives. *Journal of Head Trauma Rehabilitation*, 19, 459-81.
87. Flanagan, S.R., Hibbard, M.R., & Gordon, W.A. (2005). The impact of age on traumatic brain injury. *Physical Medicine & Rehabilitation Clinics of North America* 16(1), 163-177.
88. Cantor, J., Ashman, T., Schwartz, M., Gordon, W.A., Hibbard, M.R., Brown, M., Spielman, L., Charatz, H.J., & Cheng, Z. (2005). The Role of Self-Discrepancy Theory in understanding post-TBI affective disorders: A pilot study. *Journal of Head Trauma Rehabilitation*, 20(6), 527-543.
89. Gordon, W.A. & Brown, M. (2005). Building research capacity: The role of partnerships. *American Journal of Physical Medicine and Rehabilitation*, 84, 999-1004.
90. Gordon, W.A., Cantor, J., Ashman, T., & Brown, M. (2006). Treatment of post-TBI executive dysfunction: Application of Theory to Clinical Practice. *Journal of Head Trauma Rehabilitation*, 21(2), 156-167.
91. Gordon, W.A., Zafonte, R., Cicerone, K., Cantor, J., Brown, M., Lombard, L., Goldsmith, R., & Chandna, T. (2006). Traumatic brain injury rehabilitation: State of the Science Review. *American Journal of Physical Medicine and Rehabilitation*, 85(4), 343-382.
92. Flanagan S.R., Hibbard, M.R., Riordan, B., & Gordon, W.A. (2006). Traumatic brain injury in the elderly: Diagnostic and treatment challenges. *Clinics in Geriatric Medicine* 22(2), 449-468.
93. Sherwin, E., Whiteneck, G., Corrigan, J., Bedell, G., Brown, M., Abreu, B., Depompei, R., Gordon, W. & Kreutzer, J. (2006). Domains of a TBI minimal data set: Community reintegration phase. *Brain Injury*, 20(4), 383-389.
94. Ashman, T.A., Gordon, W.A., Cantor, J.B., & Hibbard, M.R. (2006). Neurobehavioral consequences of traumatic brain injury. *Mount Sinai Journal of Medicine* 73(7), 999-1005.
95. Gordon, W.A., Cantor, J.B., Spielman, L., Ashman, T.A., & Johanning, E. (2006). Cognitive impairment associated toxicogenic fungal exposure: A response to two critiques. *Applied Neuropsychology* 13(4), 251-257.
96. Cantor, J.B., Gordon, W.A., & Ashman, T.A. (2006). Screening for brain injury in schoolchildren [abstract]. *Journal of Head Trauma Rehabilitation*; 21, 424.
97. Gordon, W.A. (2008). Preface. *Journal of Head Trauma Rehabilitation*, 23(1), 2.
98. Ashman, T.A., Cantor, J.B., Gordon, W.A., Spielman, L., Egan, M., Ginsberg, A., Engmann, C., Dijkers, M., & Flanagan, S. (2008). Objective measurement of fatigue following traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 23(1), 33-40.
99. Cantor, J.B., Ashman, T.A., Gordon, W.A., Ginsberg, A., Engmann, C., Egan, M., Spielman, L., Dijkers, M., & Flanagan, S. (2008). Fatigue after traumatic brain injury and its impact on participation and quality of life. *Journal of Head Trauma Rehabilitation*, 23(14), 41-51.

100. Hanks, R.A., Millis, S., Ricker, J., Giacino, J., Nakase-Richardson, R., Frol, A., Novack, T., Kalmar, K., Sherer, M. & Gordon, W.A. (2008). The predictive validity of a brief inpatient neuropsychologic battery for persons with traumatic brain injury. *Archives of Physical Medicine and Rehabilitation*, 89, 950-957.
101. Kalmar, K., Novack, T., Nakase-Richardson, R., Sherer, M., Frol, A., Gordon, W.A., Hanks, R., Giacino, J. & Ricker, J. (2008). Feasibility of a brief neuropsychologic test battery during acute inpatient rehabilitation after traumatic brain injury. *Archives of Physical Medicine and Rehabilitation*, 89, 942-949.
102. Ashman, T.A., Cantor, J.B., Gordon, W.A., Sacks, A., Spielman, L., Egan, M., & Hibbard, M.R. (2008). A comparison of cognitive functioning in older adults with and without traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 23(3), 139-148.
103. Breed, S., Sacks, A., Ashman, T.A., Gordon, W.A., Dahlman, K., & Spielman, L. (2008). Cognitive functioning among individuals with traumatic brain injury, Alzheimer's disease, and no cognitive impairments. *Journal of Head Trauma Rehabilitation*, 23(3), 149-157.
104. Saatman, K., Duhaime, A.C., Bullock, R., Maas, A.I.R., Valadka, A., Manley, G.T., Brody, D., Contant, C., Dash, P., Diaz-Arrastia, R., Fertig, S., Gean, A., Goodman, C., Gordon, W., Hayes, R., Hicks, R., Langlois, J., Marmarou, A., Moore, D., Murray, G., Okonkwo, D., Papa, L., Phillips, L., Plesnila, N., Robertson, C., Robertson, C., Sahuquillo, J., Silbergelit, R., Steyerberg, E., Stocchetti, N., Teasdale, E., Teasdale, G., Temkin, N., Thompson, H., Tong, K., Wilson, L., & Wright, D. (2008). Classification of traumatic brain injury for targeted therapies. *Journal of Neurotrauma*, 25, 719-738.
105. Gordon, W.A. (2008). A wound obscure, yet serious: Consequences of Unidentified traumatic brain injury are often severe. *Cerebrum*, The Dana Press.
106. Tsiaousides, T., & Gordon, W.A. (2009) Cognitive rehabilitation following traumatic brain injury: Assessment to treatment. *Mount Sinai Journal of Medicine*, 76(2), 173-181.
107. Ashman, T.A., Cantor, J.B., Gordon, W.A., Flanagan, S., Ginsberg, A., Engmann, C., Spielman, L., Egan, M., Ambrose, A.F., Greenwald, B. (2009) A randomized controlled trial of sertraline for the treatment of depression in individuals with traumatic brain injury. *Archives of Physical Medicine and Rehabilitation*, 90, 733-740.
108. Sacks, A., Fenske, C., Gordon, W.A., Hibbard, M.R., Perez, K., Brandau, S., Cantor, J. Ashman, T. & Spielman, L. (2009). Co-morbidity of substance abuse and traumatic brain injury. *Journal of Dual Diagnosis*, 5, 404-417.
109. Gordon, W.A. (2009). Clinical Trials in rehabilitation research: Balancing rigor and relevance. *Archives of Physical Medicine and Rehabilitation*, 90(11), S1-S2.
110. Whyte, J., Gordon, W.A., Gonzalez-Rothi, L. (2009). A phased developmental approach to neurorehabilitation research: The science of knowledge building. *Archives of Physical Medicine and Rehabilitation*, 90(11), S3-10.
111. Tsiaousides, T., Warshowsky, A., Ashman, T.A., Cantor, J.B., Spielman, L., & Gordon, W.A. (2009). The relationship between employment-related self-efficacy and quality of life following traumatic brain injury. *Rehabilitation Psychology*, 54(3), 299-305.
112. Connors, S., Gordon, W., & Hovda, D. (2009). Care of war veterans with mild traumatic brain injury. *New England Journal of Medicine* 361(5), 536-537.
113. Dijkers, M., Takforce on Systematic Review and Guidelines: Boninger, M., Bushnik, T., Esselman, P. Gard, S., Gordon, W., Heinemann, A., Sherer, M., Vandergoot, D., Wehmeyer, M., & Starks, J. (2009). The value of traditional reviews in the era of systematic reviewing. *American Journal of Physical Medicine & Rehabilitation*, 88(5), 423-430.

114. Dams-O'Connor K, Gordon WA. (2010). Role and impact of cognitive rehabilitation. *Psychiatric Clinics of North America*, 33(4), 893-904.
115. Gordon, W.A. (2010). Perspective on rehabilitation research. *Archives of Physical Medicine and Rehabilitation*, 91(2), 169-172.
116. Helmick, K. et al (2010). Cognitive rehabilitation for military personnel with mild traumatic brain injury and chronic post-concussion disorder: Results of April 2009 consensus conference. *NeuroRehabilitation*, 26(3), 239-255.
117. Heinemann, W., Tulsky, D., Dijkers, M., Brown, M., Magasi, S., Gordon, W., DeMark, H. (2010). Issues in participation measurement in research and clinical applications. *Archives of Physical Medicine & Rehabilitation*, 91(9), S72-76.
118. Menon D., Schwab, K., Wright, D., Maas, A, & Demographics and Clinical Assessment Working Group of the International and Interagency Initiative toward Common Data Elements for Research on Traumatic Brain Injury and Psychological Health (2010). Position statement: Definition of traumatic brain injury. *Archives of Physical Medicine & Rehabilitation* 91(11), 1637-1640.
119. Maas, A., Harrison-Felix, C., Menon, D., Adelson, D., Balkin, T., Bullock, R., Engel, D., Gordon, W., Langlois-Orman, J., Lew, H., Robertson, C., Temkin, N., Valadka, A., Verfaellie, M., Wainwright, M., Wright, D. & Schwab, K. (2010). Common data elements for traumatic brain injury: Recommendations from the interagency working group on demographics and clinical assessment. *Archives of Physical Medicine & Rehabilitation* 91(11), 1641-1649.
120. Maas, A., Harrison-Felix, C., Menon, D., Adelson, P., Balkin, T., Bullock, R., Engel, D., Gordon, W., Langlois-Orman, J., Lew, H., Robertson, C., Temkin, N., Valadka, A., Verfaellie, M., Wainwright, M., Wright, D., & Schwab, K. (2011). Standardizing data collection in traumatic brain injury. *Journal of Neurotrauma* 28(2), 177-187.
121. Tsiaousides, T., Cantor, J.B. & Gordon, W.A. (2011). Suicidal ideation following traumatic brain injury: Prevalence rates and correlates in adults living in the community. *Journal of Head Trauma Rehabilitation*, 26(4), 265-75.
122. Tang CY, Eaves E, Dams-O'Connor K, Ho L, Leung E, Wong E, Carpenter D, Ng J, Gordon W, Pasinetti G. (2012). Diffuse disconnectivity in TBI: A resting state fMRI and Dti study. *Transl Neurosci*, 3(1), 9-14.
123. Stiers, W., Carozzi, N., Cernich, A., Velozo, C., Pape, T., Hart, T., Gulliver, S., Rogers, M., Villarreal, E., Gordon, S., Gordon, W., Whiteneck, G. (2012). Measurement of social participation outcomes in rehabilitation of veterans with traumatic brain injury. *Journal of Rehabilitation Research & Development*, 49(1), 139-154.
124. Cantor, J., Bushnik, T., Cicerone, K., Dijkers, M., Gordon, W., Hammond, F., Kolakowsky-Hayner, S., Lequerica, A., Nguyen, M. & Spielman, L. (2012). Insomnia, fatigue, and sleepiness in the first 2 years after traumatic brain injury: An NIDRR TBI model system module study. *Journal of Head Trauma Rehabilitation* 27(6), E1-14.
125. Ho, L., Zhao, W., Dams-O'Connor, K., Tang, C.Y., Gordon, W., Peskind, E.R., Yemul, S., Haroutunian, V. & Pasinetti, G.M. (2012). Elevated plasma MCP-1 contents following traumatic brain injury as a potential "predisposition" factor associated with an increased risk for subsequent development of Alzheimer's disease. *Journal of Alzheimer's Disease* 31(2), 301-313.

126. Wu, LM., Diefenbach, MA., Gordon, WA., Cantor, JB., & Cherrier, MM. (2012). Cognitive problems in patients on androgen deprivation therapy: A qualitative pilot study. *Urologic Oncology*, S1078-1439.
127. Bushnik, T., Gordon, W. (2012). Updates from the Third Federal Interagency Conference on traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 27(3), 222-223.
128. C.Y. Tang, E.L. Eaves, K. Dams-O'Connor, L. Ho, E. Leung, E. Wong, D. Carpenter, J. Ng, W. Gordon, G.M. Pasinetti. (2012). Diffuse disconnectivity in TBI: a resting state fMRI and DTI study. *Translational Neuroscience*, 3(1), 9-14.
129. Gordon, W.A. (2013). TBI and aging. *Guest Editorial, NeuroRehabilitation*, 32, 197-198.
130. Hirshson, C., Gordon, W.A., Singh, A., Ambrose, A., Spielman, L., Dams-O'Connor, K., Cantor, J. & Dijkers, M. (2013). Mortality of elderly individuals with TBI in the first 5 years following injury. *NeuroRehabilitation*, 32(2), 225-232.
131. Yuh, E., Mukherjee, P., Lingsma, H., Yue, J., Ferguson, A., Gordon, W., Valadka, A., Schnyer, D., Okonkwo, D., Maas, A., Manley, G. & The Track-TBI Investigators. (2013). Magnetic resonance imaging improves 3-month outcome prediction in mild traumatic brain injury. *Annals of Neurology*, 73(2), 224-35.
132. Zhao, W., Ho, L., Varghese, M., Yemul, S., Dams-O'Connor, K., Gordon, W., Knable, L., Freire, D., Haroutunian, V., & Pasinetti, G.M. (2013). Decreased level of olfactory receptors in blood cells following traumatic brain injury and potential association with tauopathy. *Journal of Alzheimer's Disease*, 34(2), 417-29.
133. Cantor, J., Gordon, W. & Gumber, S. (2013). What is post TBI fatigue? *NeuroRehabilitation*, 32(4), 875-83.
134. Okonkwo, D., Yue, J., Puccio, A., Panczykowski, Inoue, T., McMahon, P., Sorani, M., Yuh, E., Lingsma, H., Maas, A., Valadka, A., Manley, G. & TRACK-TBI investigators: Casey, S., Cheong, M., Cooper, S., Dams-O'Connor, K., Gordon, W., Hricik, A., Lawless, K., Menon, D., Mukherjee, P., Sinha, T., Schnyer, D. & Vassar, M. (2013). GFAP-BDP as an acute diagnostic marker in traumatic brain injury: Results from the prospective TRACK-TBI study. *Journal of Neurotrauma*, 30(17), 1490-1497.
135. Yue JK, Vassar MJ, Lingsma HF, Cooper SR, Okonkwo DO, Valadka A, Gordon WA, Maas AL, Mukherjee P, Yuh EL, Puccio AM, Schnyer DM, Manley GT; TRACK-TBI Investigators. (2013). Transforming research and clinical knowledge in traumatic brain injury pilot: Multicenter implementation of the common data elements for traumatic brain injury. *Journal of Neurotrauma*, 30(22), 1831-1844.
136. McMahon, P.J., Hricik, A.J., Yue, J.K., Puccio, A.M., Inoue, T., Lingsma, H., Beers, S.R., Gordon, W., Valadka, A., Manley, G.T., Okonkwo, D.O. (2014). Symptomatology and functional outcome in mild traumatic brain injury: Results from the prospective TRACK-TBI Study. *Journal of Neurotrauma* 31, 26-33.
137. Lu, W., Cantor, J., Aurora, R.N., Nguyen, M., Ashman, T., Spielman, L., Ambrose, A., Krellman, J.W. & Gordon W. (2014). Variability of respiration and sleep during polysomnography in individuals with TBI. *NeuroRehabilitation* ,35(2), 245-251.
138. Sorani, M.D., Yue, J.K., Sharma, S., Manley, G.T., Ferguson, A.R.; The TRACK TBI Investigators, Cooper, S.R., Dams-O'Connor, K., Gordon, W.A., Lingsma, H.F., Maas, A.I., Menon, D.K., Morabito, D.J., Mukherjee, P., Okonkwo, D.O., Puccio, A.M., Valadka, A.B. & Yuh, E.L. (2014). Genetic Data Sharing and Privacy. *Neuroinformatics*.

139. Diaz-Arrastia R, Wang KK, Papa L, Sorani MD, Yue JK, Puccio AM, McMahon PJ, Inoue T, Yuh EL, Lingsma H, Maas A, Valadka A, Okonkwo DO, Manley GT, Casey SS, Cheong M, Cooper SR, Dams-O'Connor K, Gordon W, Hricik AJ, Menon D, Mukherjee P, Schnyer DM, Sinha TK, Vassar MJ. (2014). Acute biomarkers of traumatic brain injury: Relationship between plasma levels of ubiquitin C-terminal hydrolase-L1 (UCH-L1) and glial fibrillary acidic protein (GFAP). *Journal of Neurotrauma*, 31, 19-25.
140. Cantor, J., Ashman, T., Dams-O'Connor, K., Dijkers, M.P., Gordon, W., Spielman, L., Tsaousides, T., Allen, H., Nguyen, M., & Oswald, J. (2014). Evaluation of the STEP intervention for executive dysfunction after traumatic brain injury: a randomized controlled trial with minimization. *Archives of Physical Medicine and Rehabilitation*, 95, 1-9.
141. Mitsis E., Riggio, S., Kostakoglu, L., Dickstein, D.L., Machac, J., Delman, B., Goldstein, M., Jennings, D., D'Antonio, E., Martin, J., Naidich, T.P., Aloysi, A., Fernandez, C., Seiby, J., DeKosky, S.T., Elder, G.A., Marek, K., Gordon, W., Hof, P.R., Sano, M. & Gandy, S. (2014). Tauopathy PET and Amyloid PET in the Diagnosis of Chronic Traumatic Encephalopathies: Studies of a Retired NFL Player and of a Man with FTD and a Severe Head Injury. *Translational Psychiatry*.
142. Goldin Y., Cantor J., Tsaousides, T., Spielman, L., & Gordon, W. (2014). Sexual functioning and the effect of fatigue in traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 29(5), 418-26.
143. Ratcliff J., Adeoye O., Lindsell C., Hart K., Pancioli A., McMullan J., Yue J., Nishijima D., Gordon W.A., Valadka A. (2014). ED disposition of the Glasgow Coma Scale 13 to 15 traumatic brain injury patient: Analysis of the Transforming Research and Clinical Knowledge in TBI study. *The American Journal of Emergency Medicine*, 32(8), 844-850.
144. Gordon W.A., Ashman, T.A., Brown, M., Dams-O'Connor, K., Dijkers, M.P. (2014). Remembering Joshua B. Cantor, Ph.D. *Journal of Head Trauma Rehabilitation*, 29(6), 465-466.
145. Ashman, T., Cantor, J., Tsaousides, T., Spielman, L. & Gordon, W. (2014). Comparison of Cognitive Behavioral Therapy and Supportive Psychotherapy for the Treatment of Depression Following Traumatic Brain Injury: A Randomized Controlled Trial. *Journal of Head Trauma Rehabilitation*, 29(6) 467-478.
146. Dams-O'Connor, K., Cantor, J.B., Brown, M., Dijkers, M.P., Spielman, L. & Gordon, W.A. (2014). Screening for Traumatic Brain Injury: Findings and Public Health Implications. *Journal of Head Trauma Rehabilitation*, 29(6), 479-489.
147. Dams-O'Connor, K., Gordon, W.A. (in press). Integrating interventions after traumatic brain injury: A synergistic approach to neurorehabilitation. *Brain Impairment* 14(1), 51-62.

Books and Book Chapters

1. Gordon, W., Swinyard, C.A., Chaube, C., & Mesch, J. (1978). Economic aspects of spina bifida care. In C.A. Swinyard (Ed.), *Decision making and the defective newborn*, pp. 50-57. Springfield, IL: Chas. C. Thomas.
2. Brown, M., Diller, L., Fordyce, W., Jacobs, D., & Gordon, W. (1980). Rehabilitation Indicators: Their nature and uses for assessment. In B. Bolton & D.W. Cook (Eds.), *Rehabilitation client assessment*, pp. 102-117. Baltimore: University Park Press.
3. Diller, L., & Gordon, W. (1981). Rehabilitation and clinical neuropsychology. In S. Filskov & T. Boll (Eds.), *Handbook of clinical neuropsychology*, pp. 702-733. New York: John Wiley and Sons.

4. Gordon, W.A. (1982). The behavioral disorders of children with spina bifida. In A. Baum & J. E. Singer (Eds.), *Handbook of psychology and health* (Vol. 2), pp. 213-229. Hillside, NJ: Laurence Erlbaum.
5. Brown, M., Gordon, W., & Diller, L. (1983). Functional assessment and outcome measurement: An integrative review. In E.L. Pan, T.E. Backer & C.L. Vash (Eds.), *Annual review of rehabilitation*, (Vol. 3), pp. 93-120. New York: Springer.
6. Gordon, W.A., & Diller, L. (1983). Stroke: Coping with a cognitive deficit. In T.E. Burish & L.A. Bradley (Eds.), *Coping with chronic disease: Research and applications*, pp. 113-131. New York: Academic Press.
7. Brown, M., Gordon, W.A., & Diller, L. Rehabilitation Indicators. (1984). In A.S. Halpern & M. J. Fuhrer (Eds.), *Functional assessment in rehabilitation*, pp. 187-204. Baltimore: Paul H. Brooks.
8. Feinblatt, A., Anderson, F.S., & Gordon, W.A. (1986). Psychosocial considerations. In J.C. Leek, M. E. Gershwin & W.M. Fowler, (Eds.), *Principles of physical medicine and rehabilitation in musculoskeletal diseases*, pp. 217-234. Orlando, FL: Grune and Stratton.
9. Hibbard, M., Gordon, W.A., & Diller, L. (1986). Affective disturbances associated with brain damage. In S. Filskov & T. Boll (Eds.), *Handbook of clinical neuropsychology*, (Vol. 2), pp. 305-337. New York: John Wiley.
10. Hibbard, M.R., Gordon, W.A., Egelko, S., & Langer, K. (1986). Issues in the diagnosis and cognitive therapy of depression in brain damaged individuals. In A. Freeman & V. Greenwood (Eds.), *Cognitive therapy applications in psychiatric and medical settings*, pp. 183-198. New York: Human Sciences Press.
11. Gordon, W.A. (1987). Methodological considerations in cognitive remediation. In M. Meier, L. Diller & A. Benton (Eds.), *Neuropsychological rehabilitation*, pp. 111-131. London: Churchill Livingston.
12. Gordon, W.A., Herd, J.A., & Baum, A. (Eds.) (1988). *Perspectives in behavioral medicine*, (Vol. 3). New York: Academic Press.
13. Gordon, W.A. (1991). Cognitive remediation: An approach to the amelioration of behavioral disorders. In R. Wood (Ed.), *Neurobehavioral sequelae of traumatic brain injury*, pp. 175-193. London: Taylor & Francis Ltd.
14. Gordon, W.A., & Hibbard, M.R. (1991). The theory and practice of cognitive remediation. In P. Wehman & J.S. Kreutzer (Eds.), *Cognitive rehabilitation for persons with traumatic brain injury: A functional approach*, pp. 13-22. Baltimore, MD: Paul H. Brookes.
15. Hibbard, M.R., Grober, S.E., Stein, P.N., & Gordon, W.A. (1992). Cognitive behavioral therapy in the treatment of post-stroke depression. In A. Freeman & F.M. Dattilio (Eds.), *Casebook of cognitive-behavior therapy*, pp. 303-310. New York: Guilford Press.
16. Gordon, W.A. (Ed.) (1993). *Advances in stroke rehabilitation*. Andover, MA: Andover Medical Publishers.
17. Grober, S.E., Hibbard, M.R., Gordon, W.A., Stein, P.N., & Freeman A. (1993). The cognitive therapeutic treatment of post-stroke depression with cognitive behavioral therapy. In W.A. Gordon (Ed.), *Advances in stroke rehabilitation*, pp. 215-241. Andover, MA: Andover Medical Publishers.
18. Hibbard, M.R., Gordon, W.A., Stein, P.N., Grober, S., & Sliwinski, M. (1993). A multi modal approach to the diagnosis of post-stroke depression. In W.A. Gordon (Ed.), *Advances in stroke rehabilitation*, pp. 185-214. Andover, MA: Andover Medical Publishers.

19. Hibbard, M.R., Grober, S.E., Gordon, W.A., & Stein, P.N. (1993). The diagnosis of post-stroke depression. In W.A. Gordon (Ed.), *Advances in stroke rehabilitation*, pp. 185-214. Andover, MA: Andover Medical Publishers. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1989, 70, A-54).
20. Stein, P.N., Berger, A.L., Hibbard, M.R., & Gordon, W.A. (1993). Intervention with the spouses of stroke survivors. In W.A. Gordon (Ed.), *Advances in stroke rehabilitation*, pp. 242-257. Andover, MA: Andover Medical Publishers. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1990, 71, 776).
21. Gordon, W.A. (1995). Moving into the community. *Journal of Head Trauma Rehabilitation*, 10 (4) (issue editor).
22. Dijkers, M.P., Abela, M.B., Gans, B.M., & Gordon, W.A. (1995). The aftermath of spinal cord injury. *Clinical Outcomes from the Model Systems*, Aspen Publication, 10, 185.
23. Gordon, W.A., Hibbard, M.R., Brown, M., Flanagan, S., & Campbell-Korves, M. (1999) Community integration of individuals with TBI. Rosenthal, M., Griffith, E.R., Kreutzer, J.S. & Pentland, B. (Eds.). *Rehabilitation of the adult and child with traumatic brain injury*. Third Edition. I.A. Davis, 312-325.
24. Gordon, W.A., Johanning, E., & Haddad, L. (1999). Cognitive impairment associated with exposure to toxicogenic fungi. (Eds.) Eastern New York Occupational and Environmental Health Center. *Bioaerosols, Fungi and Mycotoxins: Health Effects, Assessment, Prevention and Control*, pp. 94-98.
25. Gordon, W.A. (1999). Rehabilitation psychology. In A. Kazdin (Ed.). *Encyclopedia of psychology*. New York: Oxford University Press.
26. Hibbard, M.R., Gordon, W.A., & Kothera, L.M., (2000). Traumatic brain injury. In A. Freeman & F.M. Dattilio (Eds.), *Cognitive-behavioral strategies in crisis Intervention*, pp. 219-242. New York: Guilford Press.
27. Hibbard, M.R., Gordon, W.A., & Kenner, B. (2001). The neuropsychological evaluation: A pathway to understanding the sequelae of brain injury. In I. Suchoff, K. Ciuffreda & N. Kapoor (Eds.), *Visual and vestibular consequences of acquired brain injury*, pp. 32-47. Santa Ana, CA: Optometric Extension Program.
28. Gordon, W.A., & Hibbard, M.R. (2005). Cognitive rehabilitation. In J. Silver, T. McAllister & S. Yudofsky (Eds.), *Textbook of traumatic brain injury*, pp. 655-660. Washington, DC: American Psychiatric Publishing, Inc.
29. Gordon, W.A., Cantor, J., Charatz, H., Ashman, T. & Johanning, E. (2005). The chronicity of cognitive impairment associated with exposure to toxic mold. In E. Johanning (Ed.), *Bioaerosols, fungi, bacteria, mycotoxins and human health*, pp. 85-91. Albany, NY: Boyd Printing Company, Inc.
30. Gordon, W.A., Brown, M., Bergman, A.L., Shields, R.W. (2006). Community integration research: An empowerment paradigm. In K. Hagglund & A. Heinemann (Eds.). *Handbook of Applied Disability and Rehabilitation Research*, pp. 5-23. New York, NY: Springer Publishing Company, Inc.
31. Hibbard, M.R., Gordon, W.A. & Kothera, L. (2007). Traumatic Brain Injury. In F. Dattilio & A. Freeman (Eds.), *Cognitive-Behavioral Strategies in Crisis Intervention*, pp. 151-174. New York, NY: The Guilford Press.
32. Flanagan, S.R., Gordon, W.A. (2009). Neurovascular Neuropsychology. In J. Festa & R. Lazar (Eds.), *Pharmacological Treatment for Cognitive Disorders of Neurovascular Origin*. New York, NY: Springer Publishing, pp. 255-279.

33. Tsaousides T, & Gordon W.A. (2010). Neuropsychological interventions following traumatic brain injury. In: Ashley MJ, ed. *Traumatic Brain Injury: Rehabilitative Treatment and Case Management*. 3rd ed. Boca Raton, FL: Taylor and Francis, pp 675-696.
34. Gordon, W.A. (2011). Cognitive Rehabilitation. In J.M. Silver, T.W. McAllister & S.C. Yudofsky (Eds). *Textbook of Traumatic Brain Injury, 2nd Edition*. Sacramento, CA: American Psychiatric Publishing, Inc., pp. 579-585.
35. Tsaousides, T., Dams-O'Connor, K. & Gordon, W.A (2011). Manual of Traumatic Brain Injury Management. In F. Zollman (Ed.), *Cognition in Mild Traumatic Brain Injury: Neuropsychological Assessment*. New York, NY: Demos Medical Publishing, pp. 100-106.

Letters to the Editor

1. Gordon, W.A., Hibbard, M.R., & Diller, L. (1986). Reply to Shatin. *Archives of Physical Medicine and Rehabilitation*, 67, 64.
2. Ross, E.D., Gordon, W.A., Hibbard, M.R., & Egelko, S. (1986). Letter to the editor *Archives of General Psychiatry*, 43, 1200-1201.
3. Connors, S., Gordon, W.A., Hovda, D. (2009). Letter to the editor *New England Journal of Medicine*, 361(15), 536-538.

Dissertation

1. Gordon, W. (1972). *Auditory-visual interactions as a consequence of brain damage*. Unpublished doctoral dissertation, Yeshiva University.

Book Reviews

1. Gordon, W.A. (1978). Review: "Coping with Physical Illness." *Journal of Behavioral Medicine*, 1, 467-469.
2. Gordon, W.A. (1980). Review: "Disability and the Environment of Behavior and Rehabilitation: Behavioral Treatment of Long-stay Patients." *Social Work in Health Care*, 5, 441-442.
3. Gordon, W.A. (1983). Review: "Spinal Cord Injury Statistics: Regional Spinal Cord Injury Systems." *Rehabilitation World*, 7, 59-60.
4. Gordon, W.A. (1987). Review: "Head Trauma: Educational Reintegration." *Contemporary Psychology*, 32, 970-971.
5. Flanagan, S., & Gordon, W.A. (1996). Review: "Community-Based Employment Following Traumatic Brain Injury." *Journal of Head Trauma Rehabilitation*, 11, 103-104.

Non-Peer Reviewed Publications

1. Diller, L., Ben-Yishay, Y., Weinberg, J., Goodkin, R., Gerstman, L.J., Gordon, W., Mandelberg, I., Schulman, P., & Shah, N. (1974). Studies in cognition and rehabilitation in hemiplegia. Final report, SRS, RD-2666-P, July, 1971. Reprinted as *Rehabilitation Monograph*, 50, Rusk Institute of Rehabilitation Medicine, New York, NY.
2. Thompson, D.D., Dexter, W.R., Green, C., Krause, L., Mayclin, D., & Gordon, W.A. (1980). Personality characteristics of spinal cord injury patients at injury and one-year follow-up. *Model Systems' SCI Digest*, 2, 9-15.

3. Gordon, W.A., Hibbard, M.R., Egelko, S., Simon, D., Langer, K., Scotzin, M., Orazem, J., & Weinberg, J., (1984). Evaluation of the deficits associated with right brain damage: Normative data on the IRM test battery. New York: New York University Medical Center, Rehabilitation Research and Training Center on Head Trauma and Stroke.
4. Gordon, W.A., Hibbard, M.R., Egelko, S., Weinberg, J., Diller, L., & Piasetsky, E. (1986). Techniques for the treatment of visual neglect and spatial inattention in right brain damaged individuals. New York: New York University Medical Center, Rehabilitation Research and Training Center on Head Trauma and Stroke.
5. Brown, M., & Gordon, W.A. (2003). Living in the community after TBI: A research update. *Brain Injury Source*, 6(3), 46-47.
6. Gordon, W.A., Flanagan, S., Hibbard, M.R., & Ashman, T. (2004). Defeating depression. *Advances for Directors in Rehabilitation*, 13(5), 59.
7. Flanagan, R., Gordon, W.A., & Hibbard, M.R. (2005). Diagnostic issues in TBI in the elderly. *Brain Injury Professional*, 2(2), 22-24.
8. Hibbard, M.R., Cantor, J., Gunderson, N., Charatz, H., Ashman, T., Gordon, W.A., Brown, M., Avner, J., Ireland Knight, L., Gartner, A., Lowenstein, J., Berk, W., Quick, S., & Weinberger, J. (2005). *Mentoring Partnership Program: Mentor training workbook*. New York: RRTC on TBI Interventions, Mount Sinai School of Medicine.
9. Hibbard, M.R., Cantor, J., Gunderson, N., Charatz, H., Gordon, W.A., Brown, M., Avner, J., Lowenstein, J., Berk, W., Quick, S., & Weinberger, J. (2005). *Mentoring Partnership Program: Program manual*. New York: RRTC on TBI Interventions, Mount Sinai School of Medicine.
10. Gordon, W.A., & Brown, M. (2008). Mild traumatic brain injury: Identification, the key to preventing social failure. *Brain Injury Professional*, 5(2), 8-11.
11. Dijkers, M., Gordon, W., Abreu, B., Graham, J. & Charness, Ann (2008). The intersection of aging/age and TBI: Systematic review methodology. *Brain Injury Professional* 5(3), 8-11.
12. Sacks, A., Yi, A. & Gordon, W.A. (2008). Post-TBI aging and cognitive functioning: A systematic review. *Brain Injury Professional* 5(3), 24-25.
13. Connors, S., Corrigan, J., Ashley, M., Brannon, R., Colberg, A., Gordon, W., Gratten, K., Hinton, T., Thomas, P., Savage, R. & Vaughn, S. (2013). Brain injury as a chronic condition: Implications for public policy. *Brain Injury Professional*, 10(1), 12-14.
14. Gordon, W.A., Flanagan, S., Hibbard, M.R., Ashman, T. (in press). Post-TBI depression: An important issue for assessment and treatment. *Advances in Rehabilitation*.

Abstracts:

1. Zuger, R.R., Davis, S.W., Hunter, P.N., Gordon, W., & Goldfinger, G. (1979). Vocational placement of the spinal cord injured. Presented at the annual meeting of the American Congress of Rehabilitation Medicine, Honolulu, HI. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1979, 60, 565).
2. Gordon, W.A., Hibbard, M.R., Egelko, S., & Diller, L. (1985). The multifaceted nature of the cognitive deficits following stroke: Unexpected findings. Paper presented at the annual meeting of the American Congress of Rehabilitation Medicine, Kansas City, MO. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1985, 66, 538).

3. Ragnarsson, K.T., Dickey, R., Scotzin, M., Gordon, W.A., & Brown, M. (1985). Spinal cord patients' use and satisfaction with electronic technical aids: The quality of life impact. Paper presented at the annual meeting of the American Congress of Rehabilitation Medicine, Kansas City, MO. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1985, 66, 565).
4. Brown, M., Gordon, W.A., & Ragnarsson, K.T. (1985). Skill Indicators: A computerized approach to case management and program evaluation. Paper presented at the annual meeting of the American Congress of Rehabilitation Medicine, Kansas City, MO. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1985, 66, 535).
5. Shaver, M.S., Devivo, M.J., Ruh, R.D., & Gordon, W.A. (1986). Medical outcomes of patients injured in diving accidents: Comparison with outcomes in other etiologies. Paper presented at the annual meeting of the American Congress of Rehabilitation Medicine, Baltimore, MD. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1986, 67, 636).
6. Egelko, S., Ruckdeschel-Hibbard, M., Gordon, W.A., & Riley, E. (1986). Cognitive treatment of RBD patients: Depth vs. breadth approach. Paper presented at the annual meeting of the American Congress of Rehabilitation Medicine, Baltimore, MD. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1986, 67, 675).
7. Ruckdeschel-Hibbard, M., Egelko, S., Gordon, W.A., Riley, E., & Simon, D. (1986). The efficacy of combined visual information processing and arousal/attention remediation in right brain damaged stroke patients. Paper presented at the annual meeting of the American Congress of Rehabilitation Medicine, Baltimore, MD. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1986, 67, 675.)
8. Brown, M., & Gordon, W.A. (1987). The impact of childhood disability on the quality of life of family members. Paper presented at the annual meeting of the American Congress of Rehabilitation Medicine, Orlando, FL. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1987, 68, 656).
9. Gordon, W.A., Hibbard, M.R., Egelko, S., Diller, L., Riley, E., & Simon, D. (1988). Issues in the diagnosis of post-stroke depression. Paper presented at the annual meeting of the American Congress of Rehabilitation Medicine, Seattle, WA. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 69, 738).
10. Gordon, W.A., Hibbard, M.R., Aletta, E.G., Grober, S.E., & Paddison, P.L. (1988). Post-stroke depression: Is it right, left or both? Paper presented at the annual meeting of the American Congress of Rehabilitation Medicine, Seattle, WA. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 69, 738).
11. Hibbard, M.R., Gordon, W.A., Grober, S.E., Aletta, E. G., & Freeman, A. (1988). The treatment of post-stroke depression. Poster presented at the American Congress of Rehabilitation Medicine, Seattle, Washington. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 69, 738).
12. Gordon, W.A., Amitai, H., Langer, L. Weissman, J., & Berman, A.J. (1988). Mild TBI: A new population for rehabilitation medicine. Paper presented at the annual meeting of the American Congress of Rehabilitation Medicine, Seattle, WA. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 69, 709).
13. Aletta, E.G., Gordon, W.A., Hibbard, M.R., Grober, S.E., Paddison, P.L., & Sliwinski, M. (1989). The myths of post-stroke depression. Poster presented at the annual meeting of the American Congress of Rehabilitation Medicine, San Antonio, TX. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1989, 70, A-72).

14. Hibbard, M.R., Gordon, W.A., Stein, P.N., Grober, S., & Sliwinski, M.J. (1990). Unawareness in stroke patients: A problem of the mind not the body. Presented at the annual meeting of the American Congress of Rehabilitation Medicine, Phoenix, AZ. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1990, 71, 776).
15. Raskin, S.A., & Gordon, W.A. (1991). Cognitive remediation of memory deficits following posterior communicating artery aneurysm. Paper presented at the annual meeting of the International Neuropsychological Society, San Antonio, TX. (Abstract published in *Journal of Clinical and Experimental Neuropsychology*, 1991, 13, 104.).
16. Gordon, W.A., Amitai, H.R., Osso, D.J., & Weissman, J. (1991). Severity of injury effect on traumatic brain injured patients: Complaints and neuropsychological impairments. Paper presented at the annual meeting of the American Congress of Rehabilitation Medicine, Washington, DC. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1991, 72, 798).
17. Raskin, S.A., & Gordon, W.A. (1992). Implications of various diseases on memory remediation. Paper presented at the annual meeting of the National Neuropsychology Society, San Diego, CA. (Abstract published in *Journal of Clinical and Experimental Neuropsychology*, 1990, 14, 94).
18. Raskin, S.A., & Gordon, W.A. (1992). Cognitive remediation of cognitive deficits secondary to exposure to solvents. Paper presented at the annual conference of the International Neuropsychology Society, Durham, United Kingdom. (Abstract published in *Journal of Clinical and Experimental Neuropsychology*, 1992, 14, 378).
19. Hibbard, M.R., Stein, P.N., Ross, E., & Gordon, W.A. (1992). Neuroanatomical basis for post stroke depression. Paper presented at the annual meeting of the American Congress of Rehabilitation Medicine, San Francisco, CA. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1992, 73, 978).
20. Gordon, W.A., Hibbard, M.R., Flanagan, S., Shields, R. & Campbell-Korves, M. (1996). Life after brain injury. Paper presented at the annual meeting of the American Congress of Rehabilitation Medicine, Chicago, IL. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1996, 77, 831).
21. Richards, J.S., Pierce, C.A., Gordon, W.A., Tate, D. (1998). Life Satisfaction Post-Spinal Cord Injury and the World Health Organization Model of Disablement. Paper presented at the annual meeting of American Congress of Rehabilitation Medicine, Seattle, WA. (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1998, 79, 1343).
22. Richards, J.S., Dowler, R.N., Gordon, W.A., Tate, D.G. (1998). Satisfaction with Life Following Spinal Cord Injury: A Normative Study (Abstract published in *Archives of Physical Medicine and Rehabilitation*, 1998, 79, 1343).
23. Uysal, S., Reich, D.L., Sliwinski, M., Hibbard, M., and Gordon, W. (1999). Neuropsychological sequelae of deep hypothermic circulatory arrest. *Archives of Clinical Neuropsychology*, 14, 67.
24. Flanagan, S., Teodorescu, V., Behnegar, A., Gordon, W., Shao, M. (in press). Incidence of deep venous thrombosis (DVT) and its propagation among rehabilitation medicine inpatients with brain injury. *Archives of Physical Medicine and Rehabilitation*.
25. Goldin-Lauretta Y, Gordon W, Matsuzawa Y, Mitchell T, Spielman L, Tsiaousides T, Cantor J. (2011). Screening for traumatic brain injury: A comparison of two distinct approaches. *Arch Phys Med Rehabil*. 92, 1962.

26. Goudsmit N, Dorantes C, Nguyen M, Cantor J, Tsaousides T, Gordon W, Dams-O'Connor K. (2011). Perceptions of deficits over time among traumatic brain injury survivors: a content analysis. *Arch Phys Med Rehabil.* 92, 1722.
27. Tsaousides T, Serova S, Spielman L. (2011). Discrepancies in worker characteristics and requirements between pre-injury and post-injury employment following traumatic brain injury. *Arch Phys Med Rehabil.* 92, 1723.
28. Dorantes C, Goudsmit N, Nguyen M, Cantor J, Tsaousides T, Dams-O'Connor K. (2011). Content analysis of goal setting among traumatic brain injury survivors. *Arch Phys Med Rehabil.* 92, 1724.
29. Hirshson C, Josama P, Dams-O'Connor K, Cantor J, Tsaousides T, Spielman L, Gordon W. (2011). Mortality after traumatic brain injury in an older and ethnically diverse urban population. *Arch Phys Med Rehabil.* 92, 1727.
30. Pasinetti G. (2011). Traumatic brain injuries as a risk factor for Alzheimer's disease. *Arch Phys Med Rehabil.* 92, 1727.
31. Matsuzawa Y, Dijkers M, Tsaousides T, Gordon W, Cantor J. (2011). The experience of litigation among survivors of TBI- Are there perceived barriers to recovery? *Arch Phys Med Rehabil.* 92, 1728.
32. Balzano J.E., Spielman L, Tsaousides T, Cantor J, Dams-O'Connor K. (2011). Longitudinal changes in self-reported quality of life among individuals with TBI 10-55 years post-injury. *Arch Phys Med Rehabil.* 92, 1729.
33. Josama P, Hirshson C, Cantor J, Dams-O'Connor K, Tsaousides T. (2011). Cause of injury and mortality after traumatic brain injury in an older adult population. *Arch Phys Med Rehabil.* 92, 1730.

Presentations at Professional Meetings

1. Gordon, W. (1971). *Report on driver training research.* Driver Training Workshop, Rusk. Institute of Rehabilitation Medicine, New York, NY.
2. Diller, L., Gordon, W., Greenspan, L., & Brower, J. (1971). *Psychological and educational studies with muscular dystrophy children.* Annual meeting of the Muscular Dystrophy Association, New York, NY.
3. Gordon, W. (1972). *Public relations and rehabilitation: The patient as a consumer.* Second Symposium on Public Relations and Rehabilitation, Athens, Greece.
4. Gordon, W. (1972). *The diagnosis and remediation of learning disabilities: Current state of the art.* A series of invited presentations, East Harlem Center, New York City Bureau of Child Guidance, New York, NY.
5. Gordon, W. (1973). *Training and assessment of perceptual-motor skills and their relation to vocational placement.* (symposium moderator) American Foundation for the Overseas Blind, New York, NY.
6. Gordon, W. (1973). *The multiple roles of the psychologist in educational settings.* Invited presentation, Association for Aid to Blind Children, New York, NY.
7. Gordon, W., Gertler, M., Diller, L., Leetma, H., & Gerstman, L. (1973). *Behavioral correlates of coronary proneness.* Annual meeting of the Eastern Psychological Association, New York, NY.
8. Diller, L., Hanesian, H., Hutchinson, M., & Gordon, W. (1973). *Response patterns in brain injured children and teaching style.* Annual meeting of the American Psychological Association, Montreal, Canada.

9. Gordon, W., & Diller, L. (1973). *The relationship between physical disability and school placement in handicapped children*. Annual meeting of the American Psychological Association, Montreal, Canada.
10. Ben-Yishay, Y., Gerstman, L., & Gordon, W. (1974). *A prototype model for diagnosis, prognosis and remediation of perceptual organizational deficits: The use of block designs in rehabilitation of brain damaged adults (hemiplegia)*. Annual meeting of the International Neuropsychology Society, Boston, MA.
11. Swinyard, C.A., Diller, L., Gordon, W.A., & Chaube, S. (1975). *A follow-up study of nine hundred patients with cerebral palsy*. Annual meeting of the American Academy for Cerebral Palsy, New Orleans, LA.
12. Gordon, W. (1976). *Perceptual and cognitive problems related to stroke recovery: A look at recent research*. Invited presentation, Annual Stroke Conference, Nassau County Chapter of the American Heart Association, New York.
13. Diller, L., Sherr, R.L., Weinberg, J., & Gordon, W. (1976). *The evaluation and treatment of spatial neglect in traumatic brain damage*. Thirteenth World Congress of Rehabilitation International, Tel Aviv, Israel.
14. Brown, M., Diller, L., Fordyce, W., Jacobs, D., Barry, J., Gordon, W. & Mayer, J. (1977). *Accountability: Definitions, problems and the response of Rehabilitation Indicators*. Annual meeting of the National Rehabilitation Association, Washington, DC.
15. Gordon, W., Freidenbergs, I., Diller, L., Hibbard, M., Rothman, L., Wolf, C., & Ezrachi, O. (1977). *Assessment of psychosocial problems of cancer patients*. Annual meeting of the American Psychological Association, San Francisco, CA.
16. Freidenbergs, I., Gordon, W., Diller, L., Hibbard, M., Rothman, L., Wolf, C., & Ezrachi, O. (1977). *Problem-oriented record in psychosocial assessment/intervention with cancer patients*. Annual meeting of the American Psychological Association, San Francisco, CA.
17. Diller, L., Gordon, W., Freidenbergs, I., Hibbard, M., Rothman, L., Wolf, C., & Ezrachi, O. (1977). *The relationship between rehabilitation goal, ADL status and psychosocial problems in cancer patients*. Annual meeting of the American Congress of Rehabilitation Medicine, Bal Harbour, FL.
18. Diller, L., Weinberg, J., Gordon, W., & Diller, L. (1977). *Visual cancellation as a tool in neuropsychology*. Annual meeting of the International Neuropsychological Society, Oxford, England.
19. Gordon, W., Freidenbergs, I., Diller, L., Hibbard, M., Rothman, L., Wolf, C., Lipkins, R., Ezrachi, O., & Frances, A. (1978). *The psychosocial problems of cancer patients: A prospective study*. Annual meeting of the American Psychological Association, Toronto, Canada. (ERIC Document #ED 167-894).
20. Diller, L., & Gordon, W. (1978). *Rehabilitation Indicators: A home for ADL*. Annual meeting of the American Psychological Association, Toronto, Canada.
21. Gordon, W. (1978). *Overlapping issues in medical psychology, rehabilitation psychology and behavioral medicine*. Annual meeting of the American Psychological Association, Toronto, Canada. (ERIC Document #ED 170-622).
22. Diller, L., Gordon, W., & Freidenbergs, I. (1978). *Psychosocial factors in the rehabilitation of people with cancer*. Cleveland Cancer Center, Cleveland, OH.
23. Gordon, W., Brown, M., & Sherman, B. (1979). *Evaluating the impact of perceptual remediation: A case study*. Annual meeting of the International Neuropsychology Society, New York, NY.

24. Davis S.W., Zuger, R.R., Hunter, P.N., Goldfinger, G., & Gordon, W. (1979). *Vocational placement and spinal cord injury*. Annual meeting of the American Spinal Injury Association, Atlanta, GA.
25. Gordon, W., & Freidenbergs, I. (1979). *Efficacy of psychosocial intervention with cancer patients*. Harvard Medical School, Department of Psychiatry, Boston, MA.
26. Weinberg, J., Piasetsky, E.B., Diller, L., Gordon, W., Jaffe, I., & Sawicke, J. (1979). *Treating perceptual organization deficits in non-neglecting RBD stroke patients*. Annual meeting of the American Psychological Association, New York, NY.
27. Gordon, W.A., Freidenbergs, I., Diller, L., Hibbard, M., Wolf, C., Levine, L., Ezrachi, O., & Lipkins, R. (1979). *Effects of psychosocial interventions on cancer patients*. Annual meeting of the American Psychological Association, New York, NY. (ERIC Document #ED 18-3976).
28. Gordon, W., Brown, M., Lehman, L., Sherman, B., Farber, J., Buccheri, G., & Lucido, D. (1979). *Patterns of activities among spinal cord individuals*. Annual meeting of the American Congress of Rehabilitation Medicine, Honolulu, HI, and at the Department of Rehabilitation Medicine, University of Washington, Seattle, WA.
29. Gordon, W.A., Harasymiw, S., Belille, S., Lehman, L., & Sherman, B. (1980). *The relationship between medical and psychosocial data in SCI individuals*. Annual meeting of the American Psychological Association, Montreal, Canada.
30. Harasymiw, S.J., Mayclin, D.K., Dexter, W.R., Thompson, D.D., Gordon, W.A., & Athelstan, G.T. (1980). *Psychosocial adjustment of spinal cord injured individuals*. Annual meeting of the American Congress of Rehabilitation Medicine, Washington, DC.
31. Brown, M., Gordon, W.A., & Calsyn, D. (1980). *Rehabilitation Indicators: Application of a non-traditional approach to functional assessment*. Educational course, annual meeting of the American Congress of Rehabilitation Medicine, Washington, DC.
32. Athelstan, G.T., Dexter, W.R., & Gordon, W.A. (1981). *Psychological, social and vocational adjustment of spinal cord injury*. Instructional course, annual meeting of the American Spinal Injury Association, New Orleans, LA.
33. Sell, G.H., Goldfinger, G., Gordon, W.A., Ragnarsson, K.T., & Lewin, H.M. (1981). *Impact of implicit rehabilitation strategies on length of stay and outcome following spinal cord injury*. Annual meeting of the American Spinal Injury Association, New Orleans, LA.
34. Ahn, J.H., Lewin, H.M., Ragnarsson, K.T., Gordon, W.A., Sell, G.H., & Goldfinger, G. (1981). *Review of spinal surgery for traumatic paraplegia*. Poster, annual meeting of the American Spinal Cord Injury Association, New Orleans, LA.
35. Gordon, W.A. (1981). *Behavioral remediation in central nervous system injury*. Annual meeting of the Academy of Behavioral Medicine Research, Monterey, CA.
36. Gordon, W.A., Freidenbergs, I., & Diller, L. (1981). *Psychosocial interventions with cancer patients*. Annual meeting of the Society for Psychotherapy Research, Aspen, CO.
37. O'Neill, J., Brown, M., Gordon, W., Schonhorn, R., Antell, F., & Greer, E. (1981). *The activity patterns of retarded adults as they move from institution to the community*. Symposium, annual meeting of the American Association on Mental Deficiency, Detroit, MI.
38. Gordon, W.A., Lehman, L., Sherman, B., & Brown, M. (1981). *Social adjustment to spinal cord injury*. Annual meeting of the American Congress of Rehabilitation Medicine, San Diego, CA.

39. Ahn, J.H., Ragnarsson, K.T., Sell, G.H., Gordon, W.A., Lewin, H.M., & Goldfinger, G. (1981). *Current trends of spinal surgery for fractures of the thoraco-lumbar spine*. Poster, annual meeting of the American Congress of Rehabilitation Medicine, San Diego, CA.
40. Alexander, J., Brown, M., Gordon, W., Rintala, D., & Willems, E. (1982). *New approaches to client functional assessment, intervention, and program evaluation in rehabilitation and behavioral medicine settings*. Workshop, sponsored by the Ontario Psychological Association and the Royal Ottawa Regional Rehabilitation Centre, Ottawa, Canada.
41. Ragnarsson, K.T., Gordon, W.A., Goldfinger, G., & Warner, J. (1982). *Outcome of long rehabilitation stay: A statistical analysis*. Annual meeting of the American Spinal Injury Association, New York, NY.
42. Gordon, W.A., Freidenbergs, I., & Diller, L. (1982). *Problem oriented assessment of psychosocial difficulties of individuals with cancer*. Annual meeting of the American Psychological Association, Washington, DC.
43. Gordon, W.A. (1982). *Prosody and aprosody*. Grand rounds, Department of Rehabilitation Medicine, New York University Medical Center, New York, NY.
44. Gordon, W.A., Brown, M., & Ragnarsson, K.T. (1982). *Assessing the impact of technological innovations in the daily life of persons with disabilities*. Annual meeting of the Research Society of North America, Houston, TX.
45. Gordon, W.A., & Brown, M. (1982). *The utility of Rehabilitation Indicators to the insurance industry*. Invited presentation, Insurance Rehabilitation Study Group, Washington, DC.
46. Glenn, M.B., Carfi, J., Belille, S., Ahn, J.H., Gordon, W.A., Myers, P., Miron- Bernstein, S., & Ragnarsson, K.T. (1982). *Visceral protein status as a predictor of course and outcome on a rehabilitation service*. Annual meeting of the American Congress of Rehabilitation Medicine, Houston, TX.
47. Brown, M., & Gordon, W.A. (1983). *Applications of Rehabilitation Indicators for program evaluation and case management purposes*. Annual meeting of the National Association of Rehabilitation Research and Training Centers, Eugene, OR.
48. O'Neill, J., Brown, M., & Gordon, W.A. (1983). *Activities and skills of severely retarded persons in institutions and communities*. Annual meeting of the American Psychological Association, Los Angeles, CA.
49. Sherr, R.L., Gordon, W.A., & Brown, M. (1983). *The social and emotional impact of stroke on the lives of older people*. Annual meeting of the American Psychological Association, Los Angeles, CA.
50. O'Neill, J., Brown, M., Gordon, W., Schonhorn, R., & Buch, L. (1984). *Activities and skills of severely retarded in institutions and communities*. Annual meeting of the American Association of Mental Deficiency, Minneapolis, MN.
51. Brown, M., Ragnarsson, K.T., & Gordon, W.A. (1984). *The use of Skill Indicators in spinal cord injury case management*. Poster, annual meeting of the American Spinal Injury Cord Association, Houston, TX.
52. Gordon, W.A. (1984). *Accountability in rehabilitation patients*. Invited presentation, Connecticut Chapter, Association of Rehabilitation Nurses, Stratford, CT.
53. Langer, K.G., Hibbard, M.R., Egelko, S., & Gordon, W.A. (1984). *Depression in the physically disabled: Amputee and stroke patients*. Poster, annual meeting of the American Psychological Association, Toronto, Canada.

54. Gordon, W.A., Diller, L., Hibbard, M.R., Egelko, S., & Scotzin, M. (1984). *Trilevel perceptual remediation program for right brain damaged stroke patients*. Annual meeting of the American Psychological Association, Toronto, Canada.
55. Gordon, W.A., Hibbard, M.R., & Egelko, S. (1984). *Factors related to visual perceptual recovery in RBD stroke patients*. Annual meeting of the American Congress of Rehabilitation Medicine, Boston, MA.
56. Hibbard, M.R., & Gordon, W.A. (1985). *Affect comprehension deficits in right brain damaged stroke patients*. Annual meeting of the International Neuropsychological Society, San Diego, CA.
57. Gordon, W.A. (1985). *Programmatic research programs with right brain damaged stroke patients*. Annual meeting of the National Association of Rehabilitation Research and Training Programs, Washington, DC.
58. Gordon, W.A., Robinson, R., & Ross, E.D. (1986). *Post stroke depression*. Instructional course, annual meeting of the American Congress of Rehabilitation Medicine, Baltimore, MD.
59. Gordon, W.A., Hibbard, M.R., Egelko, S., Langer K., & Riley, E. (1986). *Unexpected cognitive and affective deficits: Right and left brain damage*. Annual meeting of the American Psychological Association, Washington, DC.
60. Gordon, W.A. (1987). *The diagnosis of post-stroke depression*. Grand rounds, Behavioral Neurology and Psychiatry, University of Texas Health Sciences Center, Dallas, TX.
61. Gordon, W.A. (1988). *Higher cognitive and executive functions*. Course presentation, Treatment and Rehabilitation Graduate Course, Department of Neuropsychology, Queens College of The City of New York, Flushing, NY.
62. Gordon, W.A., & Hibbard, M.R. (1988). *Assessment and treatment of post-stroke depression*. Course presentation, Treatment and Rehabilitation Graduate Course, Department of Neuropsychology, Queens College of The City of New York, Flushing, NY.
63. Gordon, W.A. (1988). *Cognitive remediation*. Invited presentation, New York State Head Injury Association, Albany, NY.
64. Gordon, W.A. (1988). *Cognitive remediation: Where are we? Where are we going?* Conference: Cognitive Remediation: Community Integration Through Scientifically Based Practice, Richmond, VA.
65. Gordon, W.A. (1988). *The interface between neuropsychological tests and function*. Conference: Cognitive Remediation: Community Reintegration Through Scientifically Based Practice, Richmond, VA.
66. Gordon, W.A., Amitai, H., Langer, L., Weissman, J., & Berman, A.J. (1988). *The challenge of mild TBI*. Annual meeting of the National Head Injury Foundation, Atlanta, GA.
67. Gordon, W.A. (1989). *Approaches to cognitive remediation*. Conference: The Management of the Behavioral Sequelae of Traumatic Brain Injury, Washington, DC.
68. Gordon, W.A. (1989). *What is cognitive remediation?* Grand rounds, Department of Rehabilitation Medicine, Mount Sinai Medical Center, New York, NY.
69. Gordon, W.A. (1989). *Cognitive remediation state of the art*. Instructional course. annual meeting of the American Congress of Rehabilitation Medicine, San Antonio, TX.
70. Gordon, W.A. (1990). *Issues in the neuropsychological assessment of individuals with TBI*. Invited presentation, Postgraduate Course on Rehabilitation of the Brain Injured Adult and Child, Williamsburg, VA.

71. Gordon, W.A. (1990). *A Model Systems approach to minor head injury rehabilitation.* Invited presentation, Postgraduate Course on Rehabilitation of the Brain Injured Adult and Child, Williamsburg, VA.
72. Gordon, W.A. (1990). *Rehabilitation of the memory impairments of the brain injured individual.* Course, annual meeting of the American Congress of Rehabilitation Medicine, Phoenix, AZ.
73. Gordon, W.A., Hibbard, M.R., Paddison, P.L., Stein, P.N., Grober, S., & Sliwinski, M. (1991). *The prevalence of post stroke depression.* Poster, annual meeting of the American Psychiatric Association, New Orleans, LA.
74. Paddison, P.L., Gordon, W.A., Hibbard, M.R., Grober, S.A., & Sliwinski, M. (1991). *The utility of the dexamethasone suppression test in stroke patients.* Poster, annual meeting of the American Psychiatric Association, New Orleans, LA.
75. Hibbard, M.R., Gordon, W.A., Grober, S., Aletta, E., & Freeman, A. (1990). *The treatment of post-stroke depression.* Annual meeting of the European Association of Behavioral Therapy, Paris, France.
76. Hibbard, M.R., Gordon, W.A., Grober, S., Aletta, E., & Freeman, A. (1991). *The treatment of post-stroke depression.* Second Annual European Conference on Psychology, Budapest, Hungary.
77. Gordon, W.A. (1991). *A Model System approach to mild TBI.* Annual meeting of the American Congress of Rehabilitation Medicine, Washington, DC.
78. Gordon, W.A. (1991). *Important considerations in the rehabilitation of individuals with TBI.* Invited presentation, Workshop on Vocational Rehabilitation and Community Integration of Individuals with TBI, Philadelphia, PA.
79. Gordon, W.A. (1991). *A model system approach to the rehabilitation of individuals with TBI.* Invited presentation, New York State Head Injury Association, New York, NY.
80. Gordon, W.A. (1992). *Update on cognitive remediation.* Presented at seminar sponsored by the American Congress of Rehabilitation Medicine, San Francisco, CA.
81. Gordon, W.A., Lehmkuhl, D., & Kreutzer, J. (1992). *TBI model systems of care symposium.* Annual meeting of the National Head Injury Foundation, Boston, MA.
82. Gordon, W.A. (1993). *TBI model systems of care.* Grand rounds, Department of Rehabilitation Medicine, SUNY, Buffalo, NY.
83. Gordon, W.A. (1993). *Clinical issues in the rehabilitation of persons with TBI: Perspectives from an urban model system of care.* Keynote address, Magee Brain Injury Conference: Brain Injury Rehabilitation: The Challenge of the 1990's, Philadelphia, PA.
84. Gordon, W.A. (1993). *Understanding neuropsychological assessment.* Workshop presented at the Magee Brain Injury Conference: Brain Injury Rehabilitation: The Challenge of the 1990's, Philadelphia, PA.
85. Gordon, W.A. (1994). *The use of cognitive remediation to enhance performance following brain injury.* Presentation made as part of a workshop: The Enhancement of Performance Following Brain Injury, at the Seventh World Congress of the International Rehabilitation Medicine Association, Washington, DC.
86. Gordon, W.A. (1994). *Community integration for people with traumatic brain injury.* Gaylord Hospital, Wallingford, CT.
87. Gordon, W. A. (1994). *The "how to's" of using person-centered planning to help consumers obtain independence, education and employment.* Annual meeting of the New York State Head Injury Association, Albany, NY.

88. Gordon, W.A. (1994). *Cultural diversity as it impacts on people with traumatic brain injury*. Annual meeting of the National Head Injury Foundation, Chicago, IL.
89. Gordon, W. A. (1994). *TBI and individuals with SCI*. Contemporary Forums on SCI, Washington, DC.
90. Gordon, W.A. (1994). *Improving vocational outcomes of individuals with TBI*. Workshop, New York State Department of Health TBI Best Practices Conference, Albany, NY.
91. Gordon, W.A. (1995). *PAR: A realistic strategy for medical rehabilitation research*. Invited presentation: Forging Collaborative Partnerships in the Study of Disabilities: An NIDRR Invitational Conference on Participatory Action Research, Washington, DC.
92. Gordon, W.A. (1995). *Participatory action research*. Symposium, annual meeting of the American Psychological Association, New York, NY.
93. Gordon, W.A. (1995). *TBI Technical Assistance Project*. Workshop, New York State Department of Health TBI Best Practices Conference, Albany, NY.
94. Gordon, W.A. (1995). *Participatory action research*. Symposium, annual meeting of the Brain Injury Association, San Diego, CA.
95. Gordon, W.A. (1996). *TBI and managed care*. Annual meeting of the Brain Injury Association, Washington, DC.
96. Gordon, W.A. (1996). *Teaching children with brain injury*. Workshop, New York State Department of Health TBI Best Practices Conference, Albany, NY.
97. Gordon, W.A., & Hibbard, M.R. (1997). *Life after TBI*. Symposium, annual meeting of the Brain Injury Association.
98. Pierce, C.A., Richards, J.S., Gordon, W.A., & Tate, D. (1998). *Life satisfaction post-SCI and the WHO model of disablement*. Annual meeting of the American Association of Spinal Cord Injury.
99. Gordon, W.A., & Hibbard, M.R. *Identification of kids with TBI in school*. (1998). Workshop, annual meeting of the Missouri Head Injury Conference, Columbia, MO.
100. Gordon, W.A. (1998). Keynote address, annual meeting of the Missouri Head Injury Conference, Columbia, MO.
101. Gordon, W.A. (1998). Keynote address, annual meeting of the Brain Injury Association of Connecticut, Hartford, CT.
102. Gordon, W.A., & Hibbard, M.R. (1998). *Living with TBI in the community*. Symposium, annual Meeting of the Brain Injury Association of New York State, Albany, NY.
103. Gordon, W.A. (1998) *Neuropsychological testing: What is it, how it works, what it means*. Conference: Understanding the Medical and Legal Aspects of TBI, New York, NY.
104. Gordon, W.A., Hibbard, M.R., & O'Neill, J. (1998). *Quality of life following TBI*. Symposium, annual meeting of the Brain Injury Association, New Orleans, LA.
105. Gordon, W.A., & Berkelhammer, L. (1999). *Characteristics of students with TBI in New York City schools*. Annual meeting of the International Neuropsychological Society, Boston, MA.
106. Gordon, W.A. (1999). *Coexisting disabilities: Substance abuse and TBI*. Panel presentation, New York University, New York, NY.
107. Gordon, W.A. (1999). *Second Annual Conference: Understanding the Medical and Legal Aspects of Traumatic Brain*. Sponsored by The Brain Injury Association of New York State. Injury. The Mount Sinai Medical Center, New York, New York.
108. Gordon, W.A. (1999). *Unveiling TBI*. Annual meeting of the American Psychological Association, Boston, MA.

109. Gordon, W.A. (1999). *Innovative approaches to school re-entry*. Annual meeting of the National Association of State Head Injury Administrators, State of the States in Head Injury Meeting, Kansas City, MO.
110. Gordon, W.A. (1999). *Mild TBI*. Annual meeting of the Brain Injury Association of Florida, Orlando, FL.
111. Gordon, W.A. (1999). *Mild and hidden TBI*. Annual meeting of the New York State Department of Health Best Practices Conference, Albany, New York.
112. Gordon, W.A. (1999). *Symptoms of Mild TBI*. Annual meeting of the American Association of Physical Medicine and Rehabilitation, Washington, DC.
113. Gordon, W.A. (1999). *Living with hidden and less severe TBI*. Conference: TBI in the 21st Century, Bethesda, MD.
114. Gordon, W.A. (2002). *The interaction of community participation and public policy*. Conference: Bridging the Gaps: Refining the Disability Research Agenda for Rehabilitation and the Social Sciences, Washington, DC.
115. Gordon, W.A. (2003). *Issues in concussion/mild traumatic brain injury assessment after mass trauma events*. CDC Conference on Traumatic Brain Injury in Mass Trauma Events, Atlanta, GA.
116. Gordon, W.A., & Cantor, J. (2003). *Cognitive impairment associated with exposure to toxic mold: A replication of previous findings*. Conference: Bioaerosols Fungi, Bacteria, Mycotoxins and Human Health, Saratoga Springs, NY.
117. Gordon, W.A., & Cantor, J. (2003). *The chronicity of cognitive impairment associated with exposure to toxic mold*. Conference: Bioaerosols Fungi, Bacteria, Mycotoxins and Human Health, Saratoga Springs, NY.
118. Gordon, W.A., Seekins, T., White, G., Campbell, M., & Shields, R.W. (2003). *Participatory action research (PAR) within three Research and Training Centers*. Symposium, ACRM-ASNR Joint Conference: Bridge to the Future, Tucson, AZ.
119. Gordon, W.A., & Brown, M. (2003). *Participation action research (PAR) within a Rehabilitation Research and Training Center*. Annual meeting of the American Public Health Association, San Francisco, CA.
120. Gordon, W.A. (2004). *Traumatic brain injury: The unidentified epidemic*. Conference: Traumatic Brain Injury the Last Frontier: “In A Second” Statewide Provider’s Conference, Anchorage, AK.
121. Gordon, W.A. (2004). *How to screen for traumatic brain injury?* Conference: Traumatic Brain Injury the Last Frontier: “In A Second” Statewide Provider’s Conference, Anchorage, AK.
122. Gordon, W.A. (2004). *Traumatic brain injury: The unidentified epidemic*. TBI Council for Exceptional Children Mini-Conference, Dover, DE.
123. Gordon, W.A. (2004). *Post-TBI mood disorder*. Annual meeting of the Brain Injury Association of New Jersey, Edison, NJ.
124. Gordon, W.A. (2004). *Community inclusion*. Annual meeting of the Brain Injury Association of New Jersey, Edison, NJ.
125. Gordon, W.; Fenske, C., Perez, K., Brandau, S. (2004). *Co-Morbidity between TBI and Substance Abuse*. Paper presented at: Strengthening Systems: Investing for Results. Alcoholism and Substance Abuse Providers of New York State 7th Annual Statewide Conference. New York, NY.

126. Hart, T., Cicerone, K., Gordon, W.A., & Whyte, J. (2005). *Broadening the evidence base for cognitive rehabilitation: Challenges and solutions in experimental design*. ACRM-ASNR Joint Conference, Chicago, IL.
127. Johnston, M., Cicerone, K., Esselman, P., Gordon, W.A., & Sipski, M. (2005). *Model Systems: Use of evidence guidelines to assess the state of the science in SCI, TBI and burn rehabilitation*. ACRM-ASNR Joint Conference, Chicago, IL.
128. Ashman, T.A., Cantor, J., & Gordon, W.A. (2005). *Cognitive performance and fatigue after TBI*. Presentation, International Neuropsychological Society, St. Louis, MO.
129. Brannon, R., Sipski, M., Richards, S., Gordon, W.A., Zafonte, R., Cicerone, K., Cantor, J., Brown, M., Esselman, P., & Feurback, T. (2005). *SCI, TBI and burn rehabilitation White Paper*. Presentation, American Congress of Rehabilitation Medicine, Chicago, IL.
130. Cantor, J.B., Ashman, T.A., Brown, M., Gordon, W.A., & Schwartz, M.E. (2005). *Self-discrepancy theory and post-TBI affective disorders: A pilot study*. Presentation, American Congress of Rehabilitation Medicine, Chicago, IL.
131. Gordon, W.A., & Brown, M. (2005). *Building research capacity: The role of partnerships*. Invited presentation, Rehabilitation Medicine Summit: Building Research Capacity, Washington, DC.
132. Gordon, W.A., Cantor, J., Ashman, T., & Brown, M. (2005). *Treatment of post-TBI executive dysfunction: Application of theory to clinical practice*. Invited presentation, Galveston Brain Injury Conference, Galveston, TX.
133. Gordon, W.A. (2005). *The interface between cognitive impairments and access to information technology*. Presentation, IBM Corporation, Tarrytown, NY.
134. Gordon, W.A. (2005). *Community integration of individuals with TBI*. Presentation, Defense Advanced Research Projects Agency (DARPA), Bethesda, MD.
135. Hart, T., Cicerone, K., Whyte, J., & Gordon, W.A. (2005). *Methodological issues in intervention research*. Symposium, American Congress of Rehabilitation Medicine, Chicago, IL.
136. Gordon, W.A. (2005). *Update on the diagnosis and treatment of post-TBI depression and executive dysfunction*. Workshop, New South Wales Brain Injury Rehabilitation Program, Sydney, Australia.
137. W.A. Gordon, W.A. (2005). *Keynote address - The identification of individuals with TBI: The importance of finding the “uncounted and untreated”*, New South Wales Brain Injury Rehabilitation Program, Sydney, Australia.
138. Gordon, W.A. (2006). *Identification of children with TBI*. Invited presentation, San Diego Public Schools.
139. Gordon, W.A. (2006). *Post-TBI fatigue*. Grand rounds, University of Texas Medical Branch, Galveston, TX.
140. Flanagan, S., Diaz-Arrastia, R., Hibbard, M., Gordon, W. (2006). *Diagnostic treatment challenges for the elderly with TBI*. ACRM-ASNR Joint Conference, Boston, MA.
141. Sudsawad, P., Hannold, E., Gordon, W., Spivack, M., White, G. (2006). *Translating research into practice: Bridging the gap between researchers and research consumers*. ACRM-ASNR Joint Conference, Boston, MA.
142. Cantor, J.B., Gordon, W.A., & Ashman, T.A. (2006). *Screening for brain injury in schoolchildren*. Poster, Second Federal Interagency Conference, Bethesda, MD.
143. Flanagan, S., Diaz-Arrastia, R., Hibbard, M., & Gordon, W. (2006). *Geriatric traumatic brain injury: Diagnostic and treatment challenges*. Workshop, American Congress of Rehabilitation Medicine, Boston, MA.

144. Dijkers, M.P.J.M., & Gordon, W.A. (2006, March.). *Should we do more research on treatments after TBI?* Poster, Second Federal Interagency TBI Conference, Bethesda, MD.
145. Gordon, W.A. (2006, May). *Post-TBI fatigue.* Grand rounds, University of Texas Medical Branch, Galveston, TX.
146. Gordon, W.A. (2007, August). *Update on TBI.* Presentation, Interagency Council on Disability, Washington, DC.
147. Gordon, W.A. (2008, April). *Leonard Diller Lecture: A perspective on 40 years of cognitive rehabilitation.* Rehabilitation Psychology 10th Annual Conference, Tucson, AZ.
148. Gordon, W.A. (2008, April). *The identification of individuals with TBI: The importance of finding the “uncounted and untreated”.* Annual Conference of the International Center for the Disabled, New York, NY.
149. Gordon, W.A. (2008, May). *TBI and Aging: Cognitive impairments.* Galveston Brain Injury Conference, Galveston, TX.
150. Gordon, W.A. & Whiteneck, G. (October 2008). *Historical Experience and practical considerations in designing and conducting traumatic brain injury outcome studies: Considerations for collecting clinically useful data from OIF/OEF patients.* Annual Conference of the North American Brain Injury Society, New Orleans, LA.
151. Gordon, W.A. (2008, October). *Identifying unidentified individuals with TBI.* Annual Conference of the North American Brain Injury Society, New Orleans, LA.
152. Gordon, W.A. (2008, October). *Recent research findings on post-TBI fatigue.* ACRM-ASNR Joint Educational Conference, Toronto, Canada.
153. Gordon, W.A. (2009, September). *Traumatic brain injury, aging and Dementia.* NIA Workshop, Bethesda, MD.
154. Gordon, W.A. (2009, October). *The necessary components of cognitive rehabilitation a.k.a. basic tenets of cognitive rehabilitation.* ACRM-ASNR Joint Educational Conference, Denver, CO.
155. Gordon, W.A. & Cantor, J.B (2010, February). *Cognitive Fatigue is not equal to Cognitive Impairment.* Rehabilitation Psychology Annual Conference, Tucson, AZ.
156. Gordon, W.A. (2010, April). *Presentation on NIDRR's strengths and weaknesses.* National Research Council Committee Meeting on the External Evaluation of NIDRR and Its Grantees, Washington, DC.
157. Gordon, W.A., Ashman, T.A., Tsiaousides, T., Dams-O'Connor, K. & Cantor, J. (2010, Oct.) *Executive Plus, a Comprehensive Neurorehabilitation Program: Theoretical Foundations and Clinical Implementation.* Presentation, American Congress of Rehabilitation Medicine, Montreal, Quebec.
158. Gordon, W.A. (2010, Nov). Issues relevant to the identification of individuals with TBI in the community. Presentation, Strengthening Youth and Families Conference, Austin, TX.
159. Gordon, W.A. (2011, Feb). *The Brain Injury Screening Questionnaire: An approach to screening for TBI that can be applied to soldiers.* Presentation, 2011 NATO Wounds of War III Coping with Blast-related Traumatic Brain Injury in Returning Troops, Vienna, Austria.
160. Gordon, W.A. (2011, March). *Presentation to IOM Panel on Cognitive Rehabilitation Therapy.* Institute of Medicine (IOM) Workshop for the Committee on Cognitive Rehabilitation Therapy for Traumatic Brain Injury, Irvine, CA.
161. Gordon, W.A. (2011, March). *The interaction among TBI, substance abuse and other mental health disorders.* Grand Rounds Texas Department of Human Services, Austin, TX.

162. Gordon, W.A. (2011, May). *The Interaction between Traumatic Brain Injuries (TBI), Substance Abuse and Other Mental Health Disorders*. Texas Department of State Health Services (DSHS) Grand Rounds, Austin, TX.
163. Gordon, W.A. (2011, June). *Consequences of TBI late in Life*. Presentation, Federal Interagency Conference on Traumatic Brain Injury, Washington, DC.
164. Gordon, W.A. & Lu, W. (2013, January). TBI and the Homeless. Presentation at Manhattan Outreach Consortium, Goddard Riverside Community Center.

**UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA**

IN RE: NATIONAL FOOTBALL
LEAGUE PLAYERS' CONCUSSION
INJURY LITIGATION

No. 2:12-md-02323-AB
MDL No. 2323

Kevin Turner and Shawn Wooden,
*on behalf of themselves and
others similarly situated,*

Plaintiffs,

v.

National Football League and
NFL Properties, LLC,
successor-in-interest to
NFL Properties, Inc.,

Defendants.

THIS DOCUMENT RELATES TO:
ALL ACTIONS

SUPPLEMENTAL DECLARATION OF ERIC R. NITZ

Eric R. Nitz declares, pursuant to 28 U.S.C. § 1746:

1. I am an associate at MoloLamken LLP.
2. Attached as Exhibit 1 is a demonstrative slide from Objectors' argument at the November 19, 2014 fairness hearing.
3. Attached as Exhibit 2 is a true and correct copy of Leavy, *The Woman Who Would Save Football*, Grantland (Aug. 17, 2012), <http://grantland.com/features/neuropathologist-dr-ann-mckee-accused-killing-football-be-sport-only-hope/>, accessed on December 1, 2014.
4. Attached as Exhibit 3 is a true and correct copy of Sun, *NY Giants' Steve Tisch Reveals His \$10M Plan to Further Concussion Research*, Hollywood Reporter (Sept. 11, 2014),

<http://www.hollywoodreporter.com/news/ny-giants-steve-tisch-reveals-731376>, accessed on December 1, 2014.

5. Attached as Exhibit 4 is a true and correct copy of ImPACT, <https://www.impacttest.com/about/?ImPACT-Founders-6>, accessed on December 1, 2014.

6. Attached as Exhibit 5 is a true and correct copy of Keating, *NFL's Concussions Expert Also Sells Equipment to League*, ESPN The Magazine (Aug. 10, 2007), <http://sports.espn.go.com/nfl/news/story?id=2967678>, accessed on December 1, 2014.

7. Attached as Exhibit 6 is a true and correct copy of Iverson, *Advances and Controversies in Neuropsychological Assessment: 7-Year Funding Disclosure*, http://www.sgtv.org/download/271113_iverson_advances_controversies_in_np_assessment.pdf, accessed on December 1, 2014.

8. Attached as Exhibit 7 is a true and correct copy of Chronic Traumatic Encephalopathy, *NFL Concussion Lawsuits: An Anapol Schwartz Information Website*, <http://nfl-concussions-lawsuit.com/nfl-concussion-lawsuit-news/chronic-traumatic-encephalopathy/>, accessed on December 1, 2014.

9. Attached as Exhibit 8 is a true and correct copy of The Locks Law Firm, *NFL Head Trauma Litigation*, <http://www.lockslaw.com/html/nfl.html>, accessed on December 1, 2014.

10. Attached as Exhibit 9 is a true and correct copy of Delsohn, *OTL: Belcher's Brain Had CTE Signs*, ESPN (Sept. 30, 2014), http://espn.go.com/espn/otl/story/_/id/11612386/jovan-belcher-brain-showed-signs-cte-doctor-says-report, accessed on December 1, 2014.

11. Attached as Exhibit 10 is a true and correct copy of Smith, *Ex-Falcons Lineman Had Brain Disease Linked to Concussions*, CNN Health (Apr. 1, 2011), <http://www.cnn.com/2011/04/01/health.brain.falcons/index.html>.

www.cnn.com/2011/HEALTH/04/01/brain.concussion.dronett/index.html?hpt=Sbin, accessed on December 1, 2014.

12. Attached as Exhibit 11 is a true and correct copy of McDonald, *Study Finds a Strong Correlation Between Repeated Head Trauma and Domestic Abuse*, The Washington Post (Oct. 22, 2014), <http://www.washingtonpost.com/news/morning-mix/wp/2014/10/22/study-finds-a-strong-correlation-between-repeated-head-trauma-and-domestic-abuse/>, accessed on December 1, 2014.

13. Attached as Exhibit 12 is a true and correct copy of Smith, *Lives after Junior*, ESPN (May 2, 2013) http://espn.go.com/nfl/story/_/id/9410051/a-year-later-one-junior-seau-close-friends-comes-forward-recount-version-descent, accessed on December 1, 2014.

14. Attached as Exhibit 13 is a true and correct copy of Associated Press, *Ex-Steeler Long Drank Antifreeze To Commit Suicide*, ESPN (Jan. 26, 2006), <http://sports.espn.go.com/nfl/news/story?id=2307003>, accessed on December 1, 2014.

15. Attached as Exhibit 14 is a true and correct copy of Weiner, *et al.*, *Military Risk Factors for Alzheimer's Disease*, 9 *Alzheimer's & Dementia* 445 (2013).

16. Attached as Exhibit 15 is a true and correct copy of Dao, *Brain Ailments in Veterans Likened to Those in Athletes*, N.Y. Times (May 16, 2012), http://www.nytimes.com/2012/05/17/us/brain-disease-is-found-in-veterans-exposed-to-bombs.html?pagewanted=all&_r=0, accessed on December 1, 2014.

17. Attached as Exhibit 16 is a true and correct copy of Carroll, *Could Brain Injuries Be Behind the NFL Rap Sheet?*, NBC News (Sept. 17, 2014), <http://www.nbcnews.com/storyline/nfl-controversy/could-brain-injuries-be-behind-nfl-rap-sheet-n205666>, accessed on December 1, 2014.

18. Attached as Exhibit 17 is a true and correct copy of Dall *et al.*, *Supply and Demand Analysis of the Current and Future US Neurology Workforce*, 81 Neurology 470, 470-71 (2013).

19. Attached as Exhibit 18 is a true and correct copy of Frontline, *League of Denial: The NFL's Concussion Crisis*, <http://www.pbs.org/wgbh/pages/frontline/sports/leagueofdenial/transcript50/>, accessed on December 1, 2014.

20. Attached as Exhibit 19 is a true and correct copy of Mark Fainaru-Wada & Steve Fainaru, *League of Denial* (2013).

21. Attached as Exhibit 20 is a true and correct copy of Sandomir, *Partly by Shunning Documentary, ESPN Lifts It*, N.Y. Times (Oct. 9, 2013), <http://www.nytimes.com/2013/10/10/sports/football/by-shunning-concussion-documentary-espn-gives-it-a-lift.html>, accessed on December 1, 2014.

22. Attached as Exhibit 21 is a true and correct copy of Erichson, *The NFL Concussion Settlement: Class Action Exploitation*, Mass Tort Litigation Blog (Nov. 18, 2014), http://lawprofessors.typepad.com/mass_tort_litigation/2014/11/the-nfl-concussion-settlement-and-class-action-exploitation.html, accessed on December 2, 2014.

23. Attached as Exhibit 22 is a true and correct copy of Kaplen & De Caro, *Op-Ed: Concussion Settlement Is Deeply Flawed*, National Law Journal (July 21, 2014), <http://www.nationallawjournal.com/id=1202663714809/OpEd-Concussion-Settlement-Is-Deeply-Flawed>, accessed on December 2, 2014.

24. Attached as Exhibit 23 is a true and correct copy of Daugherty, *Settlement II: Concussion Cases Become a Headache for NFL*, San Diego Reader (July 9, 2014),

<http://www.sandiegoreader.com/news/2014/jul/09/sporting-settlement-II>, accessed on December 2, 2014.

25. Attached as Exhibit 24 is a true and correct copy of Pearson & Feeley, *NFL Critics Say Concussion Accord Ignores Broken Lives*, Bloomberg (Nov. 19, 2014), <http://www.bloomberg.com/news/2014-11-19/nfl-settlement-objectors-seek-to-sway-judge-from-approval.html>, accessed on December 2, 2014.

26. Attached as Exhibit 25 is a true and correct copy of Hruby, *The NFL Concussion Settlement Is Pure Evil*, Vice Sports (Oct. 28, 2014), <https://sports.vice.com/article/the-nfl-concussion-settlement-is-pure-evil>, accessed on December 2, 2014.

27. Attached as Exhibit 26 is a true and correct copy of Hruby, *The NFL Dodges on Brain Injuries*, The Atlantic (Sept. 4, 2014), <http://www.theatlantic.com/entertainment/archive/2014/09/the-nfls-concussion-settlement-not-acceptable/379557>, accessed on December 2, 2014.

28. Attached as Exhibit 27 is a true and correct copy of Reed, *Time's Running Out To Stop Bad NFL Concussion Settlement*, League of Fans (Nov. 14, 2014), <http://leagueoffans.org/2014/11/14/times-running-out-to-stop-bad-nfl-concussion-settlement>, accessed on December 2, 2014.

I declare under penalty of perjury that the foregoing is true and correct.

Dated: December 2, 2014



Eric R. Nitz

EXHIBIT 1

What is CTE?

STAGE I	STAGE II	STAGE III	STAGE IV
Short-term memory difficulties	Short-term memory loss Executive dysfunction	Memory loss with mild dementia Executive dysfunction	Severe memory loss with dementia Executive dysfunction
Executive dysfunction	Loss of attention and concentration	Loss of attention and concentration	Profound loss of attention and concentration
Loss of attention and concentration	Explosivity / aggression	Explosivity / aggression	Explosivity / aggression
Explosivity / aggression	Suicidality	Suicidality	Suicidality
Suicidality	Headaches	Headaches	Depression
Headaches	Mood swings or depression Impulsivity Language difficulties	Mood swings or depression Impulsivity Language difficulties Visuospatial difficulties Apathy	Impulsivity Language difficulties Visuospatial difficulties Apathy Paranoia

Source: McKee et al. 2013 (Nitz Decl. Ex. 5)

EXHIBIT 2

GRANTLAND

The Woman Who Would Save Football

Dr. Ann McKee has been accused of trying to kill the sport she loves, but she may be its only hope.

BY JANE LEAVY ON AUGUST 17, 2012



The door to Ann McKee's office is a shrine to the human brain: artistic, scientific, and comic. An iridescent Andy Warhol carrying a Campbell's Soup can keeps company with a newspaper photograph of the anatomist and neurologist who created the Wilder Brain Collection at Cornell University. A teenage boy slouches across a 2006 cover of *The New Yorker*, the lobes of his not-yet-adult brain depicted under a baseball cap. "MySpace" dominates his prefrontal cortex, an illustration of just how much has changed in social media, sports, and brain science. A bumper sticker asks, "Got brains?"

Brains she's got. Brains in glass jars in the storage room across the hall from her office. Brains blown up in digital images taken from autopsies she has done on some of America's most famously deceased athletes. Brains stored in a deli case in white plastic tubs that might otherwise accommodate 10 pounds of potato salad. Brains in baggies, slices of tissue that, she says, remind some people of the pickled ginger served with sushi.

This is the Brain Bank at the Bedford Veterans Administration Medical Center in Bedford, Massachusetts. Here, in a small room dominated by stainless steel, McKee performs autopsies. She examines the brains of athletes — men and women — who, without really knowing it, put themselves in harm's way. She sees the brains of soldiers who knew the risk. In all of them, she sees what happens

when the brain is assaulted.

Among other things, Ann McKee is chief neuropathologist for the VA, Boston University's Alzheimer's Disease Center, the Framingham Heart Study, the New England Centenarian Study, and the Center for the Study of Traumatic Encephalopathy, which was created in 2008 to examine the impact of collisions between oversize human beings in pursuit of balls, yards, pucks, wins.

She is a mother, a painter, and a frustrated jock who says she can't keep up with her family. She is exhausted and inexhaustible. "I think it shows, but I can't stop."

Only she thinks she looks her age — 59. "Most neuropathologists look and sound like they've spent time in formaldehyde," says David Hovda, director of the UCLA Brain Injury Research Center. "Ann, well ..."

"She's a brilliant scientist who happens to be a little blonde bombshell," says Eleanor Perfetto, widow of former offensive lineman Ralph Wenzel, whose brain tissue is currently being studied in McKee's lab. Like McKee, Perfetto, a pharmacist who has a Ph.D. in public health and a senior position at Pfizer, knows the challenges of being a woman in a male-dominated world. "That's why people look at her and think, This is a woman who cuts up brains? There's such a dichotomy. Her work is something a lot of people would not want to do, and certainly not a lot of women. She's so unexpected."

"I'm a Cheesehead," McKee says.

This explains the framed 1968 Green Bay Packers yearbook and the January 22, 1969, cover of Sports Illustrated with Jerry Kramer cradling Vince Lombardi in his arms. Her pooches at home wear Green Bay Packers dog tags. Within reach of her desk, she has a roster of empty-headed bobbleheads — Brett Favre in green-and-gold, in white-and-green, in purple-and-white; and Aaron Rodgers, Favre's estimable successor in the huddle and in her affections. And a hero of another kind of artistry — a ringer in street clothes named Vincent van Gogh.

Every football Sunday, she parks herself in front of the TV in her authentic Packers foam Cheesehead (\$17.95 at packersproshop.com) and Rodgers's no. 12 jersey and prays that none of the men on the field end up on a dissection table. To date, she has found ravages of CTE, the neurodegenerative brain disease that has become her life's work, in over 70 athletes, nearly 80 percent of those she has examined. Among them: 18 of the 19 NFL players she has autopsied; three NHL enforcers; and a boy just 17 years old. McKee, who received \$1 million in funding from the VA as well as a home for her lab, has also documented evidence of CTE in combat veterans exposed to roadside bombs.¹

¹. "I have absolutely zero concern that it is influencing her research," says Dr. Ramon Diaz-Arrastia, director of clinical research at the Center for Neuroscience and Regenerative Medicine at the Uniformed Services University of the Health Sciences, who knows how hard it is to get scientific funding as well as McKee's scrupulous reputation.

"The coolest thing about Ann is she spends all day doing autopsies on NFL players and can't wait for the weekend to put on her Packer sweatshirt and climb into bed with a big bag of popcorn and a beer," says Gay Culverhouse, former president of the Tampa Bay Buccaneers, who now advocates on behalf of former players.

"Well, I don't usually do it in my bed," McKee says.

The Packers' loss to the Giants in the playoffs was a blow, but also an opportunity to work. By Super Bowl Sunday, she had recovered sufficient equilibrium to host a family party. She wore her Cheesehead — and even volunteered to send me a photograph. "I love it — I love football," she says, her face falling like the pocket collapsing around her favorite quarterback. "I'd like to put everything I know about it in another room when I'm watching it. But it's hard to do it through the whole game. I have enormous admiration for the physical athleticism and ability. It's strategic but requires skill that most people don't have. I get extremely caught up in it. At the end of the game I think, How could I watch this?"

The day America gave itself to Super Bowl XLVI feels as long ago as the Roman Empire. Since then?

- March 2: NFL commissioner Roger Goodell announces the findings of an investigation into bounty hunting by the New Orleans Saints, a system — football's favorite word — organized by defensive coordinator Gregg Williams.
- March 21: Goodell suspends Williams as well as Saints general manager Mickey Loomis and head coach Sean Payton.
- April 4: A tape recording of Williams's pregame exhortation is released: "Kill the head, the body will die." (Those pregame, pep talk fighting words sicken Perfetto. "I've seen what happens when the brain is killed," she told me a month before her husband's death. "It is a long, agonizing journey for that body to die.")
- April 19: Ray Easterling, former Falcons safety, commits suicide. He and his wife were lead plaintiffs in the first class action suit filed against the NFL, in August 2011, seeking damages for seven former players. A year later, there are approximately 113 suits pending, involving more than 3,000 players, which have been consolidated into a master complaint in federal district court in Philadelphia. This class action suit charges the NFL and official helmet maker Riddell with negligence and hiding information linking football-related head trauma to permanent brain injuries.²
- April 30: Headstrong, an Off-Broadway play about a former NFL player living with post-concussion syndrome, premieres.
- May 2: Goodell suspends four Saints players, including Jonathan Vilma and Scott Fujita, a member of the NFL Players Association executive committee who has advocated for independent neurologists to be on the sidelines. That same day, Junior Seau, a future Hall of Famer who did not have a diagnosed history of concussions, was found dead with a self-inflicted gunshot wound to the chest — the same awful methodology Dave Duerson chose when he killed himself, leaving a suicide note asking that his brain be left in care of Ann McKee and her team. The findings of CTE in Duerson's brain were released on May 2, 2011.
- June 13: Pop Warner football, which registered more than 285,000 children ages 5-15 to play in 2011, bans head-to-head hits and limits contact in practice to 40 minutes a day. That night, Terry Bradshaw, the former Steelers quarterback who now receives treatment for short-term memory loss at the Amen Clinic in Newport Beach, California, told Jay Leno: "In the next decade, we will not see football as it is."

². Grade 4, a more florid form of Grade 3, is generally only seen in those who live with the disease longer. "Mostly people who have lived into their 60s or 70s or who had prolonged, extensive exposure, a long career, or both," says Cantu, chief of neurosurgery and director of sports medicine at Emerson Hospital in Concord, Massachusetts.

It is a measure of the sea change in public perception that Junior Seau was immediately popularly diagnosed with CTE, despite the existence of personal problems that might have played a role in the suicide. On July 12, his family announced that part of his brain tissue had been donated to the National Institutes of Health's National Institute of Neurological Disorders and Stroke for study. Two weeks later, Goodell announced the creation of NFL Total Wellness, a new program of mental health benefits, including Life Line, a free telephone service staffed by mental health professionals and suicide prevention experts. The next day the medical examiner in Richmond, Virginia, confirmed a diagnosis of CTE in Easterling's brain.

The potential cost of employment in McKee's favorite sport is never far from her mind. She reaches for Green Bay Brett and flicks his molded-plastic noggin with her finger. The oversize head bobbles and wags, lurching back and forth on its spring like a kid trying out a pogo stick. Only the smirk on his prefab mug remains fixed.

"Get the irony?" she says.

Over the last four years, McKee has become the most visible member of a cohort of research scientists and family members — wives, mothers, daughters, and sisters of the dead, dying, and demented — who have forced the issue of chronic brain trauma into the forefront of American consciousness. The process has engendered enormous publicity as well as criticism and jealousy in the scientific community, which is every bit as competitive as the NFL. Her work has brought "a great deal of acclaim, exposure, and recognition," says neurosurgeon Robert Cantu, clinical professor of neurosurgery at Boston University and co-director of CSTE. "But at the same time it's brought a great deal of pressure. Not everybody greets her findings with the same degree of enthusiasm."

War-painted denizens of the upper deck may view her as The Woman Trying To Destroy Football. In fact, she is The Woman Trying To Save Football From Itself. The process has engendered a particular intimacy with those who entrust their loved ones to her posthumous care. Virginia Grimsley, whose husband, John, was the first NFL player diagnosed by McKee, says, "He's in good hands with her. They're all in good hands with her."

"If Joe Six-Pack was as educated as the wives that have gone through this and as Dr. McKee, Joe Six-Pack would sit down, shut up, and continue to drink his six-pack," Grimsley says. "She's not trying to destroy football."

McKee says: "I'm just trying to tell football what I see."

What she sees through her microscope is mediated by a painterly sensibility that suffuses how she talks about her work, how she approaches it, and how she presents it. She was an art major freshman year at the University of Wisconsin. She gave it up in favor of making a living, but she never quit making art. "I think you have to be creative to make a difference in science," she says. "So being artistic, it's not always going with what is accepted. I'm not your run-of-the-mill scientist."

It took an artist to see beyond Joe Theismann's splintered tibia, Johnny U's gnarled fingers, and Bo Jackson's necrotic hip to the head-banging obvious and to grasp the importance of aesthetics in changing public opinion. "Actually, I do think that makes a big difference," she says. "I think that laying out something in a visually pleasing way is very important. I look at Mad Men and how you advertise to get your point across. In order to swing public perception and gain acceptance for your work, you have to be your own advertising firm."

She photographs every brain before autopsy and memorializes slivers of tissue in irrefutable portraits of disease that line the hallways of her lab. Exhibit A: a montage she created from sections of 27 damaged brains, white matter arranged like so many Marilyn Monroes by Andy Warhol. "This is Eric Scoggins," she says. "This is Wally Hilgenberg. This is Mike Borich, a college player. We got it from the coroner, so it's not a complete section. This is John Grimsley. This is Dave Duerson. Up here we have Derek Boogaard, the hockey player."

Some painters revisit a single image again and again — a billowing sail or perhaps a lily pond — finding the particular in the generic. Tau, a protein in brain cells that turns rogue with repeated trauma, is McKee's subject; the brain is her canvas. "If you look at the paintings of Van Gogh, he saw things other people didn't see," Hovda says. "Good neuropathologists see things through a microscope that you and I don't see clearly, and I have spent a lot of time looking through a microscope. It's because they have an artistic appreciation for what they are seeing and the ability to recognize it as pathology. She has demonstrated pathology in a way that is beautiful and irrefutable."

To gaze upon McKee's montage is to see the unseen. Daniel Perl, professor of pathology/neuropathology at the Uniformed Services University in Bethesda, Maryland, who has known and worked with McKee for two decades, says: "I think she has completely changed the way we see the experience of playing football."

Can I see a brain?" I ask.

"Sure, we can go to the morgue," she says.

She leads the way down the hall to an unprepossessing room in an unprepossessing brick building on the campus of the Edith Nourse Rogers Memorial Veterans Hospital. Currently, there are 125 brains registered to the Brain Bank, among them 21 veterans who experienced mild traumatic brain injury. Chris Nowinski, co-director of CSTE and founder of the Sports Legacy Institute, a nonprofit organization dedicated to concussion awareness, secures the donations. Five hundred athletes — including him — have promised their brains to McKee.

They arrive in buckets packed in Styrofoam boxes, inside plastic bags on wet ice. Sometimes, after hours, deliveries are made to her home. Once, inadvertently, a box was left with a neighbor. "I can only imagine what they were thinking," she told Mark Kram of the Philadelphia Daily News in 2009. It hasn't happened since.

The contents are precious, so on-time deliveries are essential. "Our greatest fear is that something will get lost," she says. "We have to go from hand-to-hand-to-hand."

At the lab, the brain is weighed, photographed, and preserved in fixative, a Formalin derivative that firms

the tissue and makes it easier to cut. Half will be frozen at 80 degrees below zero Celsius for future investigators; the other half becomes McKee's raw material.

McKee regards each as a charge, a challenge, a privilege, a person. "It's actually the person of the body," she says. "If you don't have a brain, you have no identity."

She sees beauty in the infinite handiwork of the human brain and the complexity of its structure. "I do love the way the brain looks. I love the way it's shaped. When I see a brain that's been damaged, it hits you like — "

She stops.

"You see tearing of certain structures. You see holes where they shouldn't be. You see shrinkage."

She has seen brains that have defied aging and those that have aged prematurely; brains that have sustained damage from a concussive rocket blast 150 feet away and brains damaged from one too many head butts at the line of scrimmage. She has seen so many brains she has lost count. "Somewhere in the thousands," she says. "One hundred and fifty a year for 25 years — what's that?"

In the morgue there is a single autopsy table, and a drawer labeled FEET FIRST, HEAD BY DOOR. Her colleague Dr. Victor Alvarez opens the drawer, revealing the remains of an unidentified donor swaddled in a crisp white hospital sheet, a bundle as small as an Egyptian mummy. "Just like on TV," he says.

At McKee's behest, Alvarez retrieves the atrophied brain of an elderly veteran from a white bucket. Fixative had rendered it the color of a peeled potato too long exposed to the air. The weight was scribbled in Magic Marker — 1,017 grams.

"Should be 1,400," McKee says — the size of a small chicken. "The NFL guys should be 1,600. Some of them weigh half that much."

Alvarez placed the brain on a black cutting board atop the stainless steel table and took up his scalpel. He paused, almost imperceptibly, before making the practiced and decisive cut.

It felt like a sacred pause.

"That moment of awe lasts a long time, because you not only open the box but then you investigate, take photographs," McKee says. "There's a somberness that sometimes comes over the room because you're now starting to become involved."

There is excitement too. She doesn't want anyone to get the wrong idea of what she means by this. It is the exhilaration bred from intellectual rigor, the thrill of scientific discovery and the tantalizing prospect of finding a way to diagnose the disease in the living and intervene in the degenerative process before too much damage is done. The work is compelling and consuming. One morning, two new donations were delivered to the lab at the same hour a widow arrived to see where her husband had been diagnosed. McKee asked: "Do you mind if I just ... ?" The visitor understood: She just couldn't wait to take a look.

By definition, pathology begins with the denouement. "Now you're at the end, and then you're going to slowly unravel the mystery, the puzzle," McKee says. "You start with what the brain looked like at death,

get an idea of how impaired it was, and then over the next few months you're going to unravel the rest of the story."

She may know if the donor on her table played football or hockey or launched one too many headers on goal. Scientific bias precludes any further familiarity. Googling will have to come later. "I have to know the name," she says. "A number of times it's come up they want me to just use numbers, and I can't do that. It's got to have a name because it is a person, a life."

She was born into a football family in a football town some 30 miles from Lambeau Field. As a young girl she was known as AC — as in the spark plug — because she was the fastest kid in school.

Growing up she loved Barbie as much as she did Bart Starr. Of course. "She got Ken and all those wigs," McKee says.

She was a cheerleader in high school — "The only sport they allowed me to do." Her brothers played college football — as did her father, whose 1930s team picture from Grinnell College hangs in the conference room where we met. "We would spend nearly the whole summer at Post Lake," she says. "Our best friend was the high school coach, and so Mr. Dillon would have us run the tires every morning and we did football practice. That is what we'd do all summer. My brothers would let me play."

McKee on McKee: "I had promise."

She was the youngest of five children, seven years younger than the next-oldest sibling, Chuck, a star high school and college quarterback. "I just admired him like crazy," she says. "I went to every game of his. One time when I was 8 I put a sign in the yard because people would go past our house to get to the stadium: 'Chuck McKee lives here.'"

The NFL was interested, but he wasn't. "He didn't think it was so good for him, actually," she says. "He didn't say it was about his brain, but I think he was looking at his longevity. He went to medical school instead. He's a huge reason why I'm in this business."

Last on the familial depth chart — "shorter, slower, dumber — last to the table, the last in everything," she learned to "fight and scratch for position." Good training for future tussles with the NFL. A twice-divorced mother of three, she presides over an almost empty nest — her 26-year-old daughter is a med student and a newlywed; her 22-year-old son played soccer, not football. He was a great goalie, his mom says, and would have been a great wide receiver. "I would have loved him to play, because it's what you do in my family. His dad didn't want him to play. And I thought my husband was the biggest wimp because of that. Turns out now it might have helped him."

Her 16-year-old daughter lives at home in Massachusetts. "I'm still dealing with driving carpool," McKee says, rolling her eyes. "I've been a mother for a l-o-o-o-n-g time."

The no-nonsense pantsuits and plain button-down shirts she favors in public appearances may be appropriate to her very particular workplace, but do not succeed in lowering her profile. Hip red reading glasses that magnify piercing blue eyes are accompanied by an unexpectedly girlish giggle and a mordant sense of humor. She has stared down congressmen and NFL officials with those baby blues. ("She's not exactly Jack Klugman," says Robert Stern, a co-director of CSTE.)

Initially McKee was greeted by the league as enthusiastically as Vikings fans at Lambeau Field. She first met with what was then called the “Mild Traumatic Brain Injury Committee” at NFL headquarters in New York on May 19, 2009. She remembers sitting at an “enormous boardroom table with a bunch of non-smiling men in suits. The atmosphere was cool and noticeably testosterone-filled,” she says. “There were a total of two females in the room.

“The reception was one of complete dismissal. The men representing the NFL had made up their minds that anything I had to say was not accurate or not applicable. After I spoke, there was continued denial that the findings had any merit, and they proceeded to let me know that.”

“If she sat in the corner and I showed the pictures, the response would have been the same,” says Dan Perl, who also addressed the meeting. But over the years, McKee’s heightened profile and accumulated results have engendered some not-so-subtle sexism. “Being marginalized by the NFL and a lot of our colleagues — that has a lot to do with being a woman,” says Perl.

The October 28, 2009, hearings before the House Judiciary Committee represented another Rubicon. Before swearing an oath, she had to decide, “How much did I believe it?” The demented condition of a childhood hero — the Packers’ splendid safety Willie Wood — was deeply affecting, as was her testimony and that of Culverhouse, and Perfetto, all of which left Congressman Lamar Smith fuming and Congressman Ted Poe grumping about “the end of football as we know it.” Why, if Congress gets involved, Poe groused, “we would all be playing touch football out there.”

“I love the scowl she gave the congressmen,” Virginia Grimsley says. “I’d like to give them a scowl myself.”

Within a month the NFL had accepted the resignations of the co-chairmen of its discredited brain injury committee and configured a new one: the Head, Neck and Spine Committee. Cantu serves as a senior adviser, as well as medical director of the National Center for Catastrophic Sport Injury Research. In April 2010 CSTE received \$1 million in unrestricted funds from the NFL, part of which has funded McKee’s research whether it’s something the NFL agrees with or not.³

³ A study published in May in the journal *Science Translational Medicine* linked CTE in athletes to military veterans exposed to concussive battlefield blasts. The study, authored by McKee and Lee Goldstein of the Boston University School of Medicine, comparing autopsies of four athletes and four veterans, suggested that roadside bombs injure the brain in ways strikingly similar to tackles and punches. They also demonstrated evidence of the disease in laboratory animals two weeks after being exposed to a single blast.

But giving voice to the dead on *60 Minutes*, in the pages of the *New York Times*, and before Congress (four of 25 pages on her CV are devoted to media appearances) has also made her a target. Richard Ellenbogen, co-chairman of the NFL’s Head, Neck and Spine Committee and chairman of the Department of Neurological Surgery at the University of Washington School of Medicine, says she needs to publish more in peer-reviewed journals and conduct studies with controls comparing incidence in collision sports with other athletes, such as rowers and female basketball players. He also says she has crossed the divide from hard science into advocacy. “She’s possessed,” says Ellenbogen. “She is no longer impartial.”

This is a charge Cantu adamantly rejects: "She is a scientist first, not an activist first."

McKee sighs. "You get enemies in this business." She must tread a not-so-fine line between SLI's advocacy mission and the publishing protocols of medical research. "This was discussed from the day we started working together," Nowinski says. "She recognized she would be criticized in academic circles for talking about [some of] the work before academic publication. A lot of the blame — pushing for some of the information to get out comes from me."

Hovda, whose research into the neurobiology of concussions demonstrated the vulnerability of the brain to second insults, says McKee's science is rigorous, significant, and does not overinterpret the available data, which is inherently limited by the facts of neuropathology — you only get to diagnose people who are already dead.

The bull's-eye on her back is likely to remain there as long as postmortem exam remains the only way to diagnose CTE. Progress toward identifying the disease in the living has been rapid — compared to the agonizingly slow pace of Alzheimer's disease research. Blood tests for tau, diffusion tensor imaging, functional MRI, and biomarkers that will allow doctors to image the disease are all in development. Already, Hovda says, researchers at UCLA can image tau and beta-amyloid deposits in laboratory animals, and may be able to do so in humans within the year. "I'd love to put her out of this business," he says. "And I bet Ann would love me to put her out of business."

McKee says: "I'll keep this up as long as it takes."

Longevity runs in her family.

She never expected to get inside the head of the NFL. She thought she would become an internist and turned to neurology and neuropathology not to get away from people but to get closer to what makes them uniquely themselves. "They entrust me with their privacy, really," she says. "What a person's tissues look like, what struggles they were going through during life, and then what disease they have at death is a very private matter. That's as naked as you could possibly be. It's revealing yourself and revealing your internal structure."

For 25 years she studied tau in perfect anonymity, trying to understand its pivotal role in aging and Alzheimer's disease.

"Why tau?" I asked.

"Because it's pretty," was the artist/pathologist's reply.

The tau protein, named for the 19th letter of the Greek alphabet, is a naturally occurring substance in brain cells. Its job is to hold together microtubules, which are rigid, hollow rods like beach reeds that serve as conduits between brain cells. Tau provides "the scaffolding to support its shape and also to help transport molecules, nutrients, back and forth," McKee says. "Without tau the cell would collapse and the transport functions would be critically impaired."

With repeated head trauma tau turns insurgent, a guerrilla force occupying and killing more and more of the brain. "It falls off the microtubules, and so they fall apart too," McKee says.

Each concussive blow to the head — a right cross, a body check into the boards, a helmet-to-helmet collision in the open field, a header inside the goalie's circle — becomes a potential IED, a bomb hidden on a neural pathway. Think of it this way, she says: "This transport function of the cell is just like a road. And the road just fell apart."

Dementia pugilistica — punch drunkenness — first appeared in the medical literature in 1928. In 2002, Bennet Omalu, then a neuropathologist at the University of Pittsburgh, diagnosed the first known case of CTE in former Pittsburgh Steeler Mike Webster. He joined forces with Chris Nowinski, who procured three more donations, including former Eagle Andre Waters. All showed evidence of CTE.

In 2003, McKee performed an autopsy on a 72-year-old veteran who had been diagnosed with Alzheimer's disease 15 years earlier. She found toxic tangles of tau common to Alzheimer's and CTE, but they appeared in a totally unfamiliar pattern. And there was no evidence of the beta-amyloid plaques also present in Alzheimer's patients.

After the autopsy, she learned he had been a world-champion boxer. "That was the aha moment," she says. "I kept asking my colleagues if they had another boxing brain. I couldn't get it out of my mind."

McKee's laboratory does the neuropathology work for the Framingham Heart Study, the landmark multi-generational investigation into causes of heart disease. "I went back and stained all the Framingham heart disease cases we had, looking for a pattern of change that looked anything like this. I have drawers and drawers and drawers of these slides, and nothing looked like it."

"Then [in 2005] we got another through the Alzheimer's Center. There wasn't any history of head trauma. I went through all the medical records and nothing, so I got the name of the family. And I called the daughter, and she said, 'Well, he did box professionally in his 20s.' So, that was like, 'Okaaay.'"

In 2008 Nowinski came calling. He had parted ways with Omalu. He was also suffering the consequences of his WWE career, when he was known as Chris Harvard. Four wrestling concussions and two others on the gridiron had left him with severe headaches and impaired short-term memory — although he hasn't forgotten the taste of blood in the back of his throat that accompanied hits he took as a defensive tackle for the Crimson. (Thanks to a recent pickup basketball game, the count is now seven.)

He consulted Cantu about his symptoms. The doctor-patient relationship evolved into a professional alliance. They created SLI and later partnered with Robert Stern, director of Boston University's Alzheimer's Disease Clinical & Research Program, to create the Center for the Study of Traumatic Encephalopathy with the goal of acquiring and examining brains of deceased athletes exhibiting symptoms of premature dementia. All they needed was someone to do the autopsies. "Have I got the neuropathologist for you!" said Stern.

McKee sounds a lot like a football coach when she talks about her team at the Brain Bank, except, she says, her people give 400 percent. Over the course of three or four painstaking months, McKee's staff will cut half the brain into slices the thickness of white bread. They will use a high-tech deli slicer called a Microtome to shave 50-micron slivers of tissue — 0.001968 inches — which will shrink to less than half that size and be stained, fixed to slides, and magnified, perhaps 100 times, under the microscope.

"Handwork," she calls it.

Unstained, tau is unidentifiable. Staining makes the texture and the damage palpable. Some pathologists use a blood-red color to dramatize areas of disease. McKee favors brown, the color of dried blood.

On the day I visited, she spoke about the woman who prepared her slides for the last decade and whose devotion to her craft, despite failing health, was that of a mother hoping to find a way to protect her son. “An artisan,” McKee calls her. “Like a person who makes a mosaic out of a million little pieces. It can take three or four hours just to lay the tissue out on the slide” — not including cutting and staining — “because you get it when it’s wet and you have to manually smooth down every single teeny-tiny wrinkle.”

John Grimsley, a linebacker who suffered three concussions in college and eight in the NFL, was the first NFL player whose tissue they examined. What McKee saw was so unprecedented in her experience that she twice asked Dan Perl to come look at the slides. It was a case of: Do you see what I see? He did. “When you look at the tangles, you say, ‘Wow,’ ” Perl says.

While McKee and her staff dissect and preserve tissue, Stern, who oversees the CSTE registry, interviews family members to develop a case history: number of years and position played and in what decade, number of concussions suffered and symptoms noted. The most frightening finding is that “the biggest problem isn’t the concussions, actually,” McKee says. “It’s the sub-concussive hits that mount up every single time these guys line up.”

It’s been estimated that there are 1,000 to 1,500 of those kinds of hits per season per person in the NFL. “A big job liability,” she says.

In November, Stern received a \$1.5 million grant from the National Institutes of Health to study 100 former players between ages 40 and 69 with symptoms consistent with CTE who played positions at the greatest exposure for getting hit in the head — defensive linemen, linebackers, offensive linemen, and defensive backs. The goal is to establish risk factors for the disease and genetic predisposition. “If we can figure out the genetic risk, we could be much smarter about informing individuals who are considering playing these sports what their relative risks are,” McKee says.

Despite new NFL rules limiting the number of padded practices, and protecting defenseless receivers, the cumulative effect of violent collision remains dire. McKee believes there is “a window of reversibility” of perhaps one year before the disease has had “a chance to gain speed [and] cause the cells to die.”

Stern: “With each brain that comes in, especially the younger ones, and especially the ones without any known significant history of concussions, but a whole lot of sub-concussive blows, that’s where she gets really scared. That’s where we all get really scared.”

Posters hanging in the conference room show the sickening march of the disease — an 18-year-old who looked like he had cigarette holes burned in his brain; Owen Thomas, a junior and co-captain of the University of Pennsylvania football team who never suffered a concussion; Dave Duerson, who played 11 years in the NFL.

McKee has developed a four-tier system for staging the disease that first invades the front cortex — the province of judgment, insight, inhibition, and concentration — and then begins to “work its way inward, penetrating the essence of a person.”

Staging is determined by the amount and distribution of tau. In Grade 1, a few hot spots appear on the surface, clustered around small blood vessels. “You see those holes on the side walls, the holes and tangles in a circle around the hole?” she says, pointing to Owen Thomas’s damaged brain tissue. “That’s a 21-year-old brain!”

The blood vessels vex her and perplex her. “Why the blood vessels?” she says, tracing a painterly splatter on his brain with her forefinger. “What am I missing?”

She was talking to the disease, not to me.

In Grade 2, the spots multiply but most brain tissue is undisturbed. Thomas had Grade 2 of the disease when he committed suicide; the 18-year-old had Grade 1.

In Grade 3, the neurofibillary tangles she likens to skeins of unraveling yarn invade multiple lobes of the brain. Besieged, the medial temporal lobe atrophies. The hippocampus, essential for learning and memory, is attacked. The amygdala, which governs aggressiveness and rage, is assaulted. Symptoms multiply and intensify: headaches, depression, insomnia, anxiety; loss of impulse control, executive function, and emotional regulation; tremors, vertigo, slurred speech and a staggered gait; and finally dementia.

A slide of Dave Duerson’s tissue demonstrates the awfulness of Grade 3 CTE. Under the microscope his brain tissue looks like the bark of a tree. “You see all those little spots of damage?” McKee says. “And he doesn’t even have the worst case of this. This is really substantial disease, especially since he’s only 50.”⁴

⁴ There is also litigation pending against individual franchises. Eleanor Perfetto filed the first workman’s compensation claim, against the San Diego Chargers, on her husband’s behalf in April 2010. Her attorney expects the first of the 50 such suits he is handling to go to trial in January.

Women lose lovers, friends, husbands, partners. Men lose their way, their memories, their lives. Ministers forget verses from the Bible. Hall of Famers fail to recognize themselves on trading cards. Outpatients get lost en route to the doctor. “A lot of ex-wives step in to help their ex-husbands,” says Culverhouse, who created the Players’ Outreach Program in Tampa Bay to provide health care and disability benefits for former players. She has an Ed.D. from Columbia University, a terminal illness, and a history of concussions from falling off too many horses. (She, too, has promised her brain to McKee.) Her clinic schedules appointments on Saturdays so players aren’t recognized. “One of the ex-wives set the GPS so her former husband could get to our medical center,” she says. Hours after his appointment, one of the nurses found him driving around the parking lot in circles. “No one had reset the GPS.”

With each new report about reckless, homeless, abusive players, drug addiction and suicide, McKee wonders: How much is attributable to brain disease and how much to the corrosive effect of celebrity and entitlement on a particular personality structure?

“There are horrible life changes in terms of memory, emotion, and lack of impulse control, which heaps gobs of negativity on them, divorce, addiction, businesses that fail,” Cantu says. “It’s a vicious cycle, a perfect storm. The final event for those that die young is not the brain damage per se but what the brain damage has led them to do, which is what caused Dave Duerson to put a gun to his chest.”

Duerson's last conscious act was to preserve his brain for science. That choice, Cantu says, also guaranteed a very painful death.

The most affecting of McKee's visual aids is a triptych she created documenting the progression of the disease. When she paints, she prefers oils, figurative painting. This digital portrait is deconstructed 21st-century abstract art.

The first panel, a slice of healthy brain tissue, reminds me of one in a series of Sam Francis paintings called "Blue Balls" but rendered in purples and whites. The second panel, a section of John Grimsley's brain, looks like a Jackson Pollock — Shimmering Substance, perhaps. The last panel from the boxer, who was her patient zero, calls to mind Willem de Kooning's Excavation.

The images have entered the public domain and the collective sporting unconscious thanks to permissions granted by family members. Still, Virginia Grimsley had the wind knocked out of her one day a year or so after her husband's death when she saw one of McKee's brain images flash across the TV screen: John's brain. She reminded herself — "It's good. It's all good. It has to come out."

Then she left a message for Nowinski. "You might want to warn the families."

Nowinski had hand-delivered John's slides to Houston in advance of the Family Conference, a conference call with family members during which she and Stern present their findings. Grimsley doesn't remember much from that time. Her synapses were snapped when her 45-year-old husband, a lifelong hunter, accidentally killed himself while cleaning a new gun. She now believes that he forgot that there were bullets in the chamber. She asked her boss, a pediatrician, to be on the call when she got the results from Stern and McKee. But it turned out Grimsley didn't need a translator because, she says, McKee is "so plain-English."

For McKee, the Family Conference is her first chance to fill the holes in the lives she sees under the microscope. For the wives, mothers, and daughters she calls "the crusaders," it is an opportunity to reclaim their loved ones from memories and reputations ravaged by disease.

"They're the only witnesses, which is also what intrigues Ann," Nowinski says. "The worst things are only seen by one person, and these stories never would see the light of day without them."

This is when she feels most like a clinician. "I'm being a doctor to people, but now the people are the families they've left behind."

She is asked "a million questions," Nowinski says, and stays on the line as long as there are answers she can give. "She allowed me to talk," Grimsley says simply. "I think she got a sense of who John was. This is not just brain tissue to her. This is someone's life, someone's memory, someone's husband, someone's son, someone's father."

After two and a half hours, Grimsley finally had a way to understand how a man who made his living as an outdoor guide ending up shooting himself to death. For the first time since his death in February 2008, she could exhale.

Tom McHale's slides arrived by mail at his widow's home along with a caution from McKee: "You might want to wait to open them until we are on the phone together."

Lisa McHale couldn't wait.

The impact was concussive. Her body shook. Her mind went blank.

McHale, who now works as a liaison between families and SLI, had been so sure they wouldn't find anything; so positive he had never suffered a concussion during nine years as an NFL offensive lineman. But doctors at the drug rehab center where he was treated for repeated relapse, depression, and irritability had no answers for them. "You seem to have embraced all that we have," a doctor told Lisa and Tom days before his death. "I've treated professional athletes before and I've had a similar problem, and I don't know what the problem is. Maybe it's the humility thing. Maybe you just can't reach that level of humility."

Lisa thought: You don't know my husband at all.

But she was no longer sure she ever knew him. Where was the sweet boy she met in college at Cornell? Who was this addict who used drugs with their three children in the house? Who succumbed to the overdose that killed him after Lisa told him he had to leave? Maybe I just remember Tom wrong, she thought. Maybe I glamorized him — because nobody's that good, and nobody changes that much.

After McKee presented her findings, McHale told her: "You gave me back my Prince Charming."

Sylvia Mackey heard from McKee and Stern two weeks before the Super Bowl in February, seven months after the death of her husband, John, the Hall of Fame tight end, no. 88 for the Baltimore Colts. She was the moving force in the creation of Plan 88, which pays \$88,000 a year toward the care of players with dementia, and she is still fighting for the benefits she and other widows are due. She wasn't apprehensive about receiving McKee's report — she was relieved that the results confirmed what she already knew inside. Her 45-year-old son cried.

She says the diagnosis of CTE and frontal temporal dementia explained John's fixation with what she calls his "man bag," a black leather shoulder bag he took everywhere, including to Bobby Mitchell's charity golf tournament in Washington, D.C. "You couldn't touch it," she says. "At a photo session, a lady reached for it and he pushed her back and cursed at her. It was the last time he was invited."

The bag contained the Sharpies he used to sign his autograph: John Mackey, no. 88. The prosaic tools of the celebrity trade were a reminder of who he had been. "We had to send that bag to the assisted living facility," she says. "Finally he forgot about it."

By then he couldn't remember anything at all.

On June 18, Eleanor Perfetto called Nowinski to make arrangements for her husband's brain to be delivered into McKee's care. Ralph Wenzel, who was 69, had been institutionalized since early 2007. Perfetto had long considered herself a widow.

Ralph disappeared little by little after being diagnosed with dementia in 1999. "One morning he got up and went into the bathroom before I could get him dressed," she says. "He came back and said, 'I need to get dressed. There are people in the bathroom.'"

Perhaps he was confused by his own nakedness. The doctors weren't sure.

By Christmas of 2006, belligerence had supplanted hallucination and delusion. He went to live in a lockdown facility. A month later, Perfetto and Wenzel gave an interview to Bernard Goldberg of HBO's Real Sports, though she did all the talking. By then, Wenzel, a high school physical education teacher in his second career, could barely speak. "He hadn't spoken the whole day," Perfetto says. "They probably filmed him six or seven hours. They were hauling the equipment out of the facility. He walked up to Bernie like he wanted to say something. Bernie said, 'Yes, Ralph, what is it?'

"Ralph looked at him very seriously and he said, 'The kids. The kids.'"

Ann McKee doesn't sleep.

"How could she?" Mackey says.

Complete brain rest, the prescription for concussed athletes, is not an option for her. "I wake up in the middle of the night and I work," she says. "I get up and write part of a grant proposal. I dream about their slides. I dream about their lives. I can't put this to bed."

Painting is her refuge — the one place in her life that tau has not infiltrated. She works with a private instructor at an art studio and tries to get there twice a week. "The reason I love art is if you're really painting you are not thinking about this," she says, nodding at an example of brain portraiture. "You have to completely spiral your brain in a different direction. Once you get into that zone, you're resting your brain. I still struggle with this work being very analytical and art being very non-analytical. So to put the two together is a real brain cramp."

She says her house and garden are a wreck. She's embarrassed to have people over. Nowinski sees the toll elsewhere. "She covers it up incredibly well in public," he says. "But there's times she talks about how this research is slowly killing her."

In October 2011, McKee and Kevin Turner were honored at the fourth annual SLI Impact Awards dinner in Boston for their work on behalf of brain-trauma awareness. Turner, a college star for the Crimson Tide and fullback for the Patriots and Eagles, was embarrassed to share the award with her. "What did I do?" he says. "I just got diagnosed with ALS."

Turner, the subject of a new documentary, American Man, was diagnosed with amyotrophic lateral sclerosis — Lou Gehrig's disease — in May 2010. Two months later, McKee published a study linking traumatic brain injury with an ALS-type disease, which she has subsequently documented in 11 athletes, amateur and professional.

Turner was among 40 to 50 athletes at the banquet who had promised their brains to McKee. But unlike most of them, he is unlikely to survive her tenure at the Brain Bank. As he accepted a hug and a plaque, he knew that the woman with whom he shared the podium and an embrace will someday receive a Styrofoam box containing his brain and spinal cord. "I want her to use it all," he says.

The guests included family members of traumatic brain injury victims — Perfetto, McHale, and Mackey among them — and athletes of every age and pursuit. "Most were men, and they wanted to meet her because to them, she's a rock star," Nowinski says. "She's the person they're trusting their legacy to. They trust her to take care of their brain and how they're remembered. So I had everybody line up in a

receiving line as she went up to the podium to accept the award. Everybody cried. Everybody got a hug."

I reached Kevin Turner in his pickup truck at a fast-food drive-in in Birmingham, Alabama. He was grabbing a sandwich en route to his younger son's basketball game. He pulled his boys out of football after listening to Cantu explain the vulnerability of the brain between ages 6 and 14, which made him less popular than he once was in Birmingham. He will allow his older son, Nolan, to return to the field this fall for freshman year in high school once he turns 15. "My youngest, he's 8," he says. "He doesn't know it yet, [but] he's going to take a break until high school."

By the time I caught up with Turner again six months later, Cole had turned 9 and was complaining bitterly about playing flag football instead of "real football." Things had gotten harder for his father too. He can no longer zip his pants or get himself a glass of water or reach into his pocket for his wallet. (He carries a bag now.) His sons know where he keeps the credit cards. They pump the gas and help change the gearshift when dad is driving, as he was when I reached him again.

He pulled over so we could talk, and a police officer stopped to make sure he was OK. Turner told him he was fine. "I can still breathe, so I can't complain," he says.

He still lives alone but is looking to hire someone to be his hands. He can't rely on his daughter and sons anymore. He doesn't go out to eat much. It's hard to get a fork in his mouth, to get to the bathroom in time, to change the channel on the remote, to answer the telephone. A lot of calls go unanswered.

In June, talking was a problem. It's better now. "One day it felt like there was something in my mouth. I was trying to spit it out," he says. "It felt like I had just come out of the dentist. I couldn't feel my lips."

Turner told me in February that he hoped to visit McKee's lab to see where the work is done. He wondered "what they'll be saying when they're digging into my head — 'here's one of his dumb jokes. We need to take that part out.'"

He also said he was worried that knowing him will make McKee's job more difficult. He wants to have a conversation with her, perhaps in September when he is scheduled to attend a conference in Boston on traumatic brain injury and ALS. "I think I know what I'm going to say," Turner told me. "I'd hope I'd say, 'I'm so happy it's in your hands. I want you to be smiling and thinking about how much fun I had my whole life.' I don't want her to have a bad day at the office."

EXHIBIT 3

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NY Giants' Steve Tisch Reveals His \$10M Plan to Further Concussion Research

7:00 AM PST 09/11/2014 by Rebecca Sun

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Smallz & Raskind

In THR's Top Doctors Issue, the NFL team's owner, who is supporting UCLA's BrainSPORT Program, and Dr. Christopher Giza explain the plan to help young athletes

This story first appeared in the Sept. 19 issue of The Hollywood Reporter magazine.

As co-owner of the New York Giants, **Steve Tisch** is attuned to the dangers surrounding **concussions in the NFL**. But the Oscar-winning producer also cares deeply about the risks facing young athletes, which is why in May he pledged \$10 million to UCLA's BrainSPORT Program for concussion research, with a focus on the millions of youth who play sports. "If coaches get state-of-the-art information about how to recognize a head injury and how to treat it, it's very comforting as a parent," says Tisch, 65, whose daughter **Holden, 14, sustained a concussion** last year playing lacrosse.

Dr. **Christopher Giza**, the program's director, notes that the **young brain** continuously is evolving. "If it gets damaged and is not allowed to recover, that development is going to go off the tracks," he says. "The goal is to figure out the differences between concussion in kids and adults and then develop individualized

treatment plans for the young athletes." With Tisch's gift, which Giza calls "transformative," BrainSPORT will baseline test athletes from middle school to college and create diagnostic tools precisely calibrated for age and gender. Dr. **Neil Martin**, UCLA's chair of neurosurgery, adds that the program will finally locate definitive answers to long-asked questions: "How many concussions are too

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many? How long do you have to wait before you can return to competition? Is there a long-term risk that might threaten brain function?" We're going to accumulate knowledge so that we can manage the game to be as safe as possible."

By addressing these issues early, Tisch believes pro football's future will benefit as well. "Our players start when they're 8, 12 years old," says Tisch, whose donation is the most an individual ever has given for the **study of concussions**. "Hopefully my gift to UCLA will inspire other NFL owners to do something similar. This is good for everybody."

STEVE TISCH TOP DOCTORS

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EXHIBIT 4

ImPACT Test

ImPACT Founders

ImPACT Applications, Inc., is based in Pittsburgh, Pennsylvania and was co-founded by Mark Lovell, Ph.D., Joseph Maroon, M.D., and Michael (Micky) Collins, Ph.D. in 2002. The science behind ImPACT was developed in response to requests for neurocognitive testing from the NFL to help determine safe return to play. The ImPACT Concussion Management Model was first put into use in 1997. Today, ImPACT is constantly updating products, services and its training programs by integrating new technologies, input from experts and users, and ongoing research on concussion rehabilitation methods.



Mark Lovell, Ph.D.

Mark R. Lovell, Ph.D., is internationally recognized as a concussion expert for his development of innovative neurocognitive testing programs and ground breaking research. Dr. Lovell served as the Chairman and Chief Executive Officer of ImPACT Applications from 2002 through 2013, and currently serves as Chairman of the Board and Chief Scientific Officer. In the early 1990's he developed the ImPACT® Test which is the first, most-widely used and most scientifically validated computerized concussion evaluation system. The ImPACT Test has become an internationally used tool in the comprehensive clinical management of concussions. Dr. Lovell's expertise led to his development and direction of the first league wide neuropsychological testing programs for the National Football League (NFL) and National Hockey League (NHL). Dr. Lovell remains a neuropsychological consultant for several organizations throughout the world including, but not limited to, the NFL Players Association, NHL, Irish Rugby, USA Women's Olympic Hockey team, World Wrestling Entertainment (WWE) and the US Ski and Snowboard team.

In 2000 Dr. Lovell became the founding director of the University of Pittsburgh Medical Center's (UPMC) Sports Medicine Concussion Program. Dr. Lovell's pioneering approach to concussion management attracted professional athletes from around the world to the UPMC Concussion Program. Until his retirement from clinical practice in 2011, Dr. Lovell directed the UPMC program, which has been regarded as the first and largest program of its kind.

Dr. Lovell is a leader in concussion research, publishing over 100 peer-reviewed articles, authoring or co-authoring nine textbooks and writing over 40 book chapters. He is an instrumental force in spreading concussion education and awareness among the public and medical community. Dr. Lovell served as a panel member for the Center for Disease Control's Coaches Toolkit and has trained thousands of medical professionals on neurocognitive testing and concussion management. Dr. Lovell's contributions to the neuropsychological community have allowed him to be a frequent presenter at professional meetings internationally and serve as a member of the Vienna and Prague

JA5298

His vast accomplishments include the Council of Brain Injury Award for Excellence, National Concussion Summit Excellence in Safety Award, USA Hockey Excellence in Safety Award, American Board of Professional Neuropsychology Distinguished Clinical Neuropsychologist Award and most recently his alma mater, Northern Michigan University, awarded him with an Honorary Doctor of Science degree for his pioneering work in managing sports concussions.

Dr. Lovell is a member of various professional and scientific organizations including the International Neuropsychological Society, American Psychological Association and North American Brain Injury Association. In addition to being a member of several prestigious organizations, Dr. Lovell has been a reviewer for over 15 professional journals and is currently serving as an editorial board member for several different journals.



Joseph Maroon, M.D.

Joseph Maroon, MD, FACS is professor and Vice Chairman of the Department of Neurological Surgery and Heindl Scholar in Neurosciences at the University of Pittsburgh School of Medicine. He is regarded as a premier specialist in the surgical treatment of injuries and diseases of the brain and spine, particularly with microscopic and minimally invasive procedures. His research into brain tumors, concussions and diseases of the spine has led to many innovative techniques for diagnosing and treating these disorders. Dr. Maroon has published over 270 papers and is on the editorial boards of Surgical Neurology International, The Physician and Sportsmedicine, and Neurological Research. He is consistently listed in America's Best Doctors and he has an international patient clientele.

He has been the team neurosurgeon for the Pittsburgh Steelers since 1981 and the medical director for World Wrestling Entertainment Corporation since 2006. He has successfully performed surgery on numerous professional and elite athletes with potentially career ending spine injuries. He has also served on the National Football League's Head, Neck and Spine Committee since 2007.

Along with Mark Lovell, Ph.D., in the early 1990's Dr. Maroon co-developed ImPACT® (Immediate Post Concussion Assessment and Cognitive Testing); the first, most-widely used and most scientifically validated computerized concussion evaluation system.

As an avid athlete himself, he has completed over 70 triathlons, seven of these Ironman distance races in Hawaii, Europe, New Zealand and Canada. Dr. Maroon is frequently quoted as an expert source by national media including the *New York Times*, *USA Today*, *Associated Press*, *ESPN*, *Sports Illustrated* and *ABC News Nightline*.



Micky Collins, Ph.D.

Michael "Micky" Collins, Ph.D., is an internationally renowned expert in sports-related concussion. A leading clinician and researcher, Dr. Collins serves as the clinical and executive director and a founding member of the UPMC Sports Medicine Concussion Program. Established in 2000, it was the first program of its kind; more than a decade later, it remains the largest research and clinical program focused on the assessment, treatment, rehabilitation, research and education of sports-related mild traumatic brain injury in athletes of all levels.

Dr. Collins' expertise attracts elite and professional athletes from around the world seeking the comprehensive care he provides and the multidisciplinary approach he helped to introduce. On a daily basis, Dr. Collins and his UPMC program colleagues see dozens of patients – embodying youth, high-school, collegiate and pro athletes -- with concerns about safe return to play and return to school/work following treatment and rehabilitation.

Besides his extensive clinical experience, Dr. Collins also has been a lead author and investigator on numerous groundbreaking studies of high-school and college athletes published in *JAMA*, *Neurosurgery*, *American Journal of Sports Medicine* and *Pediatrics*, among others. He has been the lead author or co-author on more than 60 peer-reviewed research articles in medical journals and has delivered more than 250 presentations at national and international scientific meetings. National and local media often interview him as an expert source.

Dr. Collins has been an instrumental source across the nation in developing concussion-management policy in youth sports, return-to-play laws and the Centers for Disease Control's concussion toolkit. He is a co-founder of ImPACT® (Immediate Post-Concussion Assessment and Cognitive Testing). As a result, he is a leader in educating and implementing the proper usage of such baseline and post-injury neurocognitive testing as one tool to help determine an injury's severity and recovery for safe return to play.

In addition to training thousands of physicians and certified athletic trainers in the diagnosis and management of sports-related concussion, he advises numerous athletic organizations and teams – including several major-college programs (Florida, Florida State, Louisiana State and Michigan State to name a few), the NFL Steelers, the NHL Penguins, numerous MLB clubs, MLB Umpires, USA Rugby and Cirque De Soleil. He also serves as a consultant or on the editorial board of such publications as *Brain Injury Professional*, *Journal of Athletic Training* and the *Journal of Sports Neurology*, where he is Associate Editor.

A graduate of the University of Southern Maine with a bachelor's degree in psychology and biology in 1991, Dr. Collins earned a master's degree in psychology in 1995 and doctorate degree in clinical psychology in 1998 at

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Michigan State University. Among numerous national and international honors over the past decade, Dr. Collins in 2010 received the National Council on Brain Injury annual award for outstanding research and advocacy. In 2009, he was bestowed the Kenneth L. Knight Award for outstanding research. An athlete himself, Dr. Collins played for the University of Southern Maine in the 1989 NCAA Baseball College World Series and trained to run in the 2012 Pittsburgh Marathon.

EXHIBIT 5



ESPN.com: NFL

[\[Print without images\]](#)

Thursday, August 9, 2007
 Updated: August 10, 5:29 PM ET

NFL's concussions expert also sells equipment to league

By Peter Keating
 ESPN The Magazine

The National Football League's director of neuropsychological testing is also the chairman of a company that sells testing software to NFL teams, a dual role which raises questions about conflicts of interest.

Mark Lovell, director of the Sports Concussion Program at the University of Pittsburgh Medical Center, oversees neuropsychological testing programs for the NFL. In that capacity, he has helped teams use neurocognitive tests -- which essentially grade subjects on their memory and reaction time -- to help team doctors make decisions about when injured athletes can return to play. This season, baseline neuropsychological tests will be mandatory for all NFL players for the first time.

In the late 1990s, Lovell and Joseph Maroon, clinical professor of neurological surgery at the University of Pittsburgh and team neurosurgeon for the Pittsburgh Steelers, developed their own computer-based battery of tests, calling it the Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT) system. Together with Michael Collins, assistant director of the Sports Concussion Program at Pittsburgh, they launched a company called ImPACT Applications to make their product commercially available. Today, Lovell is chairman and software developer at ImPACT Applications, Collins is chief clinical officer and Maroon is chief medical officer.

At the same time, Lovell and Maroon are members of the NFL's Committee on Mild Traumatic Brain Injury (MTBI), which conducts research projects designed to help the league better understand and manage concussions.

Lovell is also a consultant to the Steelers, and oversees neuropsychological testing programs for the Indianapolis Racing League (IRL) and CHAMP Car Racing. From 1997 to 2007, he co-directed the National Hockey League's neuropsychology program.

Lovell's overlapping roles and financial interest in ImPACT have drawn criticism from several doctors and athletic trainers working in the field of sports concussions. Their ire has intensified as Lovell sometimes has not identified himself as one of ImPACT's developers in his scientific research. On at least seven occasions since 2003, Lovell has authored or co-authored studies on neuropsychological testing, including papers directly evaluating ImPACT, without disclosing his roles in creating and marketing ImPACT, according to an ESPN.com review of recent medical literature. In one case, an examination of Lovell's connections prompted an academic journal to rewrite its disclosure guidelines for authors.



ImPACT is used by trainer Erin Cearfoss last August at Northern Burlington County Regional High School in New Jersey.

"It is a major conflict of interest, scientifically irresponsible," says Christopher Randolph, professor of neurology at Loyola University Medical Center in Chicago and former team neuropsychologist for the Chicago Bears. "We are trying to get to what the real risks are of sports-related concussion, and you have

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to wonder why they are promoting testing. Do they have an agenda to sell more ImPACTs? And if you're writing a paper and you have anything to do with a company involved, it's imperative that you disclose it."

Earlier this year, NFL commissioner Roger Goodell ordered all teams to implement baseline neuropsychological tests. ImPACT, which is one of a handful of computerized neuropsychological systems available (CogSport, the Concussion Resolution Index, and the Automated Neuropsychological Assessment Metrics are among the others) has since become the league's *de facto* standard testing system. Thirty of the NFL's 32 teams now use ImPACT, according to the company's Web site.

"I can see why the league would want one standardized test," says a leading neurosurgeon, who asked to remain anonymous because his patients include former NFL players. "I can't for the life of me understand why they would want that standard to be a test that is owned by two members of the [MTBI] committee."

Lovell declined to reply by e-mail or telephone to questions sent to him by ESPN.com. He also declined a request to be interviewed by "Outside the Lines."

"These are very important issues that are too complicated to address in an edited 10-second sound-bite," says Susan Manko, spokesperson for the University of Pittsburgh Medical Center.

In a statement to ESPN.com, NFL spokesman Greg Aiello said: "The commissioner is not expecting the committee to specifically recommend a single neuropsych[ological] testing protocol. Most of the clubs have already decided to use the ImPACT test on their own, or were already using it. There are many members of the committee who have had no role in developing ImPACT and no financial interest in it. And ImPACT has been the subject of a good deal of independent study."

Scientists are currently debating how useful ImPACT and other computerized systems are in diagnosing concussions. Citing multiple studies, Lovell and his colleagues have stated that "ImPACT has been shown to be an effective tool for concussion management." They have asserted repeatedly that ImPACT measures real effects, not just the ability of subjects to improve on tests with practice, and that it can discern even mild concussions.

But almost all of the research supporting ImPACT has been written or co-written by its inventors. For example, Lovell and Collins are co-authors of all 19 of the publications listed in the "Reliability and Validity" section on the ImPACT Web site. "I think ImPACT is a good system, and we use it at West Virginia," says Julian Bailes, chairman of the neurosurgery department at West Virginia University and medical director for the Center for the Study of Retired Athletes. "Most of the studies on ImPACT, however, have been by the people who developed it. Some of that is inevitable, because we are still relatively early in the process of trying to validate it."

In 2005, the Journal of Athletic Training published a study co-written by Loyola's Randolph that surveyed the preceding 15 years of medical literature on neuropsychological testing. It found: "Only one peer-reviewed article involving a prospective controlled study with ImPACT has been published."

More recently, independent research has cast doubt on the overall value of computerized testing. In a study that will be published later this year in

Outside the Lines

On Sunday, "Outside the Lines" will examine the journeys of two men who have become unlikely partners in the common belief that brain damage from repeated concussions in football can lead to depression, dementia and suicide. One is a former pro athlete whose career was ended by concussions; the other is a doctor who worked on the autopsies of two former NFL players.

In addition, "Outside the Lines" takes a close look at

the Journal of Athletic Training, researchers gave computerized tests to a group of uninjured college students, then tested them again 45 days later. ImPACT incorrectly identified the subjects as having some aspect of a concussion in 38.4 percent of cases. "We tested three computerized systems and found all of them to be less than optimal," says Steven Broglio, lead author of the study and professor of kinesiology at the University of Illinois at Urbana-Champaign. Broglio declined to elaborate on the data because it has yet to be published, and did not supply it to ESPN.com. But he confirmed that it was presented to NFL team doctors and athletic trainers at the concussion summit the league held on June 19 in Chicago.

"Neurocognitive testing is only one tool for assessing injuries," Broglio says. "Athletes can also be evaluated according to their symptoms and their postural control, meaning how well they maintain their balance. Our published research has found that when you look at all three, computerized tests have about the same sensitivity to concussions as paper-and-pencil tests."

Traditional paper-and-pencil tests gauge the subject's memory by methods such as asking for recall of word lists, and the subject's processing speed by measures such as using a key to coordinate symbols with numbers in a series of fill-in boxes on a page.

The computerized systems such as ImPACT basically adapt the same sorts of testing procedures to a machine.

"I have a lot of concern with ImPACT, as I still have not seen a good study of basic psychometric properties that suggest ImPACT is as good or better than paper-and-pencil tests," says one veteran NFL team neuropsychologist, who did not want to be identified as publicly criticizing Lovell or the NFL. "Computer tests look cool on the screen and seem very sophisticated, but they are really just fancy stopwatches." Among neuropsychologists' worries: differences in computer architecture and hardware (such as whether the software is running on a desktop or a laptop), the possibility that other applications are open and how a subject uses his computer's mouse all could affect the accuracy of ImPACT's timing measurements.

Nevertheless, Lovell's company, ImPACT Applications, is aggressively and successfully marketing its software. ImPACT is a private company and does not disclose its annual revenue or profits. But the firm, which is based in Pittsburgh, has sales representatives as far away as Australia and South Africa. It sells desktop and online versions of ImPACT to organizations and schools in packages ranging in price from \$500 to \$1000 per year, plus extra charges for additional tests. It also holds training workshops, charging doctors and athletic trainers from \$100 to \$200 to attend daylong seminars in Pittsburgh. Sessions include "Development of ImPACT," "On-Field Management of Concussion" and "Question and Answer Forum on the ImPACT Test, Marketing Your Services and Using the Media to Promote Your Sports Concussion Practice," according to a sample agenda on the company's Web site. An Aug. 3 workshop was filled, with 24 participants; ImPACT is now accepting registrations for another seminar series on Sept. 21.

But readers of Lovell's academic work will find scarce mention of these business activities, even in research he has conducted on ImPACT itself.

In the March 2006 edition of *Brain Injury*, for example,

Mark Lovell's ImPACT test and its use by the NFL, and explores whether it is good science to have a member of the league's concussions committee analyzing data and helping set policy using a product in which he has a financial interest.

Guests include Garrett Webster, the son of late former NFL center Mike Webster; and ESPN The Magazine's Peter Keating. "Outside the Lines" is hosted by Bob Ley. Tune in Sunday at 9:30 a.m., ET, on ESPN.

Lovell and three co-authors described ImPACT as a "brief computer-administered neuropsychological test battery" without detailing its origins. The acknowledgments to that study contained the equivalent of an advertisement for the software: "Additional information on ImPACT is available at www.impacttest.com."

After receiving a complaint about that paper and another co-authored by Lovell last year, the editorial board of Brain Injury decided to require researchers to state more fully any possible conflicts of interest. "We share your concern ... Your letter has inspired us to develop a fair and appropriate policy which will be communicated to our authors," Jeffrey Kreutzer, editor of Brain Injury, wrote on April 4, 2006, to a reader who had expressed concerns about Lovell and ImPACT.

"Some of the people publishing on neuropsychological testing had a financial interest in it," Kreutzer, who is also a professor of physical medicine and rehabilitation, neurosurgery and psychiatry at the Virginia Commonwealth University Medical Center, says today. "So we spiffed up our disclosure policy."

In the January 2006 issue of the British Journal of Sports Medicine, a study by Lovell and three other researchers found that athletes with one or two prior concussions did not differ significantly from athletes with no prior concussions in their performance on ImPACT tests. The authors rejected the idea that the results could have stemmed from any flaws in ImPACT: "The failure to detect possible persisting problems from one or two previous concussions is probably not due to inadequate sensitivity of the computerised screening measure."

The conclusion of that paper listed "competing interests" of the authors. It read: "None declared."

"I was responsible for the Web-based electronic submission of this article," says Grant Iverson, professor of psychiatry at the University of British Columbia and a co-author of the paper. Iverson contacted ESPN.com at Lovell's request. "If mistakes were made therein, they were my fault," he says.

Potential conflicts of interest have cropped up even in research where Lovell has revealed his involvement with ImPACT. In the February 2006 issue of Neurosurgery, Lovell and three members of the MTBI Committee published a study that used ImPACT test scores to look at how NFL and high school athletes recovered from concussions. The acknowledgments to that paper stated: "Dr. Lovell has a financial interest in the ImPACT computer based neuropsychological test battery used by many NFL teams."

But in the peer reviews immediately following the paper, the first two commenters were Collins and Maroon, Lovell's fellow corporate officers at ImPACT Applications. They lauded ImPACT, writing: "We think that computerized neuropsychological testing as outlined in this study will become the standard of care to assist physicians with their clinical judgment in assessing and managing athletes with mild traumatic brain injury."

Their roles in developing and marketing ImPACT were not disclosed.

Peter Keating writes about sports business for ESPN The Magazine.

Roger Goodell



NFL commissioner Roger Goodell has mandated baseline neuropsychological testing for all players for the first time this season.

EXHIBIT 6

Advances and Controversies in Neuropsychological Assessment

Grant L. Iverson, Ph.D

Department of Physical Medicine and Rehabilitation
Harvard Medical School

&

Red Sox Foundation and Massachusetts General Hospital Home Base Program

7-Year Funding Disclosure

- Canadian Institute of Health Research
- Lundbeck Canada, AstraZeneca Canada, Pfizer Canada
- ImPACT Applications, Inc. (past research support)
- CNS Vital Signs (past research support)
- Psychological Assessment Resources, Inc. (past support)
- Tampere University Hospital
- Roche Diagnostics Canada
- Alcohol Beverage Medical Research Council
- Defense and Veterans Brain Injury Center
- Vancouver Coastal Hospital Health Research Institute
- Red Sox Foundation and Massachusetts General Hospital Home Base Program

Topics

- Self-Reported Symptoms
 - Nonspecific
 - “Good Old Days” Bias
 - Exaggeration
- Cognitive Testing
 - Accuracy and Specificity
 - Prevalence of Low Scores in Healthy People
 - New Algorithms for Identifying Cognitive Impairment

#1

Neuropsychological assessments rely on
(1) self-reported symptoms, and (2)
cognitive testing.

Are long-term symptoms caused by the
original injury, other factors, or both?

Post Hoc Ergo Propter Hoc

- After this therefore because of this
 - A. MTBI in accident
 - B. Symptoms reported two years later
- A caused B. Therefore, symptoms are due to MTBI (by inference, due to brain damage)

“Postconcussion-Like” Symptoms are Common

University students

Mental health outpatients

General medical patients

Chronic pain patients

Personal injury litigants

Applied Neuropsychology
2003, Vol. 10, No. 3, 137–144

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Lawrence Erlbaum Associates, Inc.

Examination of “Postconcussion-Like” Symptoms in a Healthy Sample

Grant L. Iverson

University of British Columbia & Riverview Hospital, Vancouver, British Columbia, Canada

Rael T. Lange

University of British Columbia, Vancouver, British Columbia, Canada

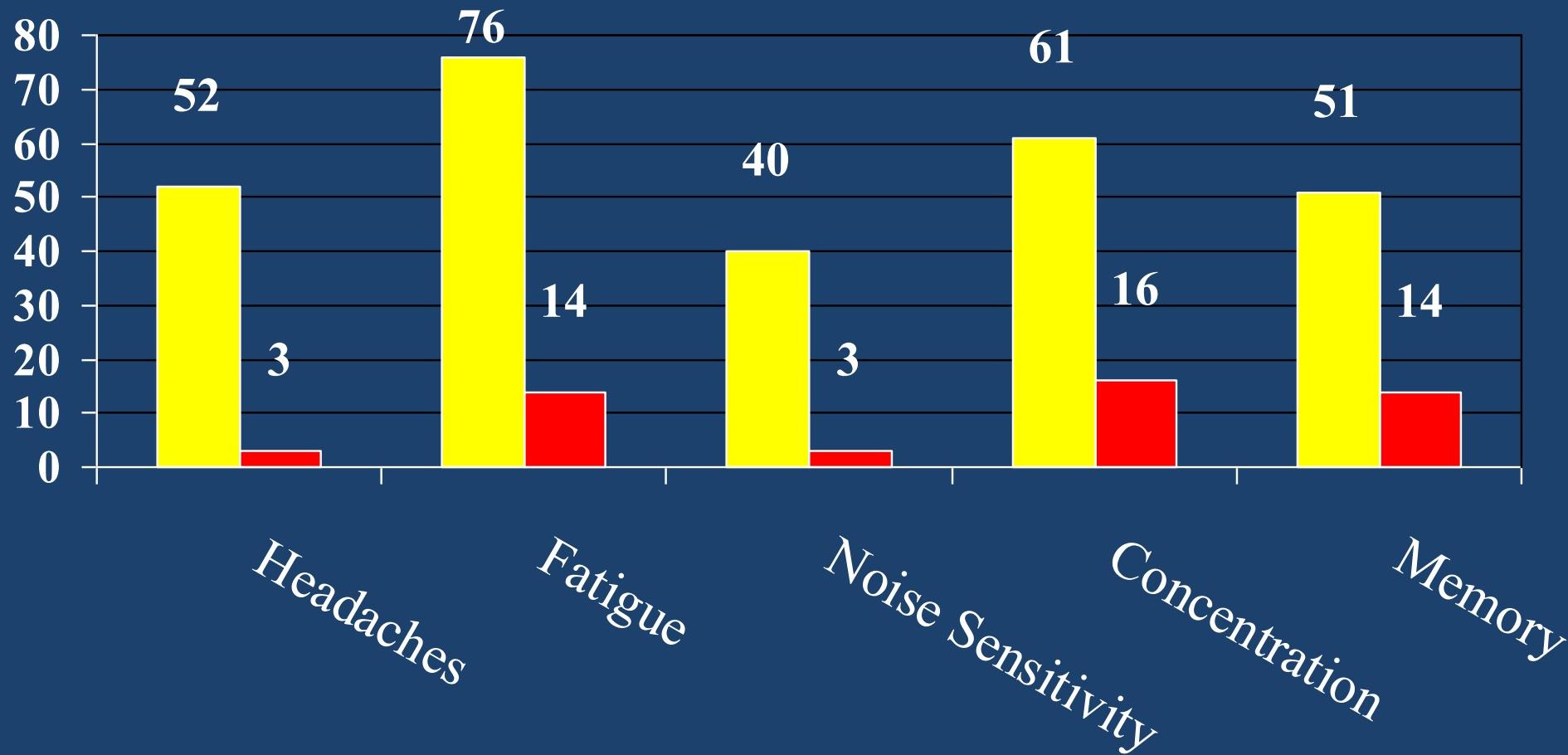
PCS-Like Symptoms in Community Volunteers

- 104 community control subjects from the greater Vancouver area
- Exclusion criteria: (a) previous mental health problem, (b) brain injury, (c) neurological disorder, (d) substance abuse.
- All completed a PCS checklist patterned after the ICD-10 Criteria.

Iverson & Lange (2003)

PCS-Like Symptoms in Community Controls

(Yellow = Mild; Red = Mod-Severe)



DSM-IV Diagnosis of Postconcussional Disorder

79.6%

Moderate – Severe Symptom Endorsement

14.6%



Archives of Clinical Neuropsychology 21 (2006) 303–310

Archives
of
CLINICAL
NEUROPSYCHOLOGY

Misdiagnosis of the persistent postconcussion syndrome in patients with depression

Grant L. Iverson *

Department of Psychiatry, University of British Columbia & Riverview Hospital, 2255 Wesbrook Mall, Vancouver, BC V6T 2A1, Canada

Accepted 14 December 2005

Misdiagnosis of PCS in Depression

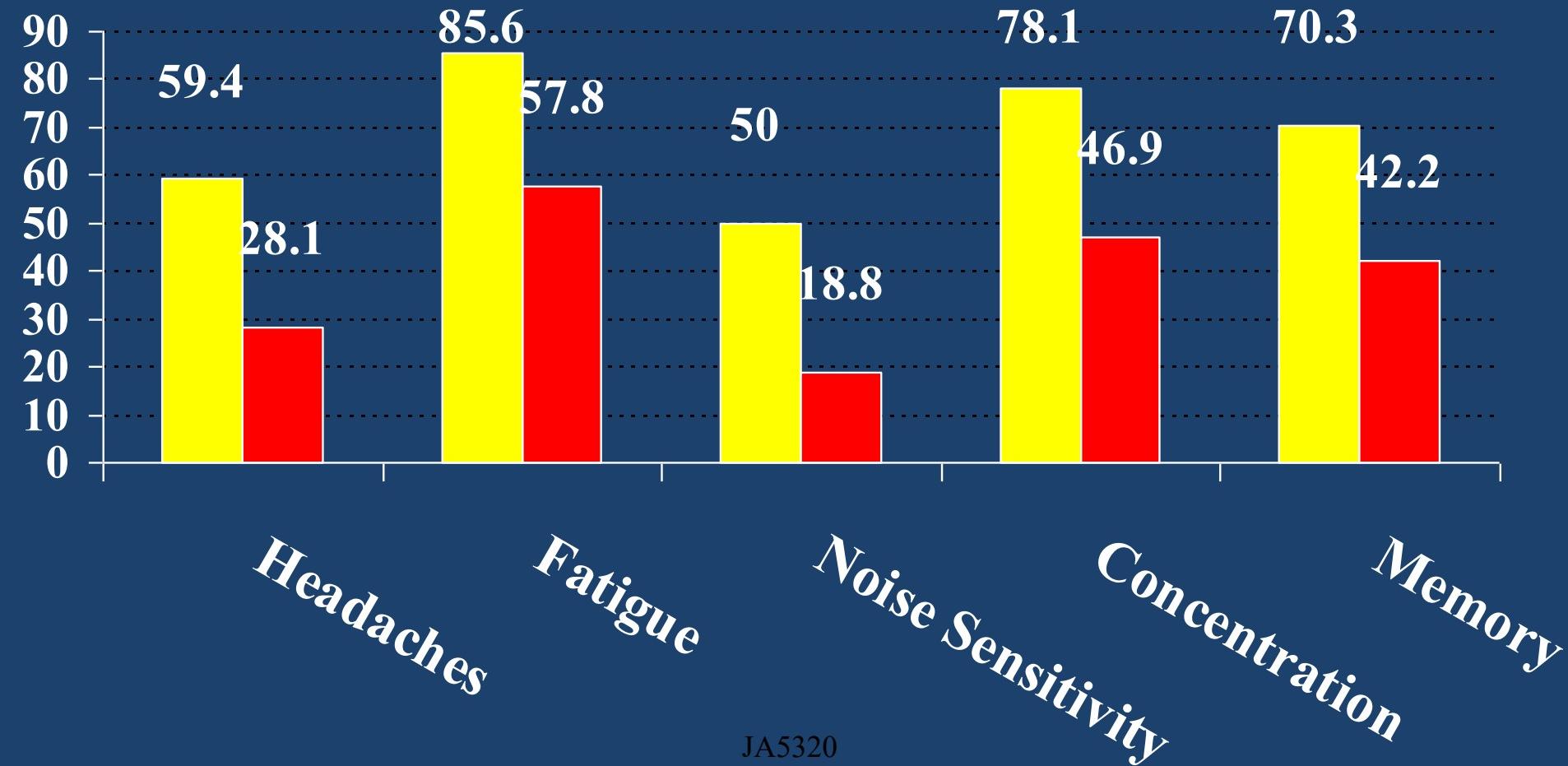
- 64 patients with depression
- Diagnosed and referred by family physician or psychiatrist
- Independently confirmed diagnosis with SCID-I

Iverson (2006)

Case#18-2012nd Document: 00311331658651 Page:8022/12 Date Filed:08/09/2019

PCS-Like Symptoms in Patients with Depression

(Yellow = Mild; Red = Mod-Severe)



DSM-IV Diagnosis of Postconcussional Disorder

85.9%

Moderate – Severe Symptom Endorsement

53.1%

#2

Some people look back on their past
with “rose-colored glasses”

Or misrepresent past symptoms and
problems

The Clinical Neuropsychologist, 2009, 1–21, iFirst
<http://www.psypress.com/tcn>
ISSN: 1385-4046 print/1744-4144 online
DOI: 10.1080/13854040903190797



"GOOD OLD DAYS" BIAS FOLLOWING MILD TRAUMATIC BRAIN INJURY

**Grant L. Iverson¹, Rael T. Lange², Brian L. Brooks³,
and V. Lynn Ashton Rennison⁴**

¹*University of British Columbia and British Columbia Mental Health & Addiction Services, Vancouver, BC*, ²*British Columbia Mental Health & Addiction Services and University of British Columbia, Vancouver, BC*, ³*Alberta Children's Hospital and University of Calgary, Calgary, AB*, and ⁴*Fraser Health Authority Concussion Clinic and Royal Columbian Hospital, Vancouver, BC, Canada*

Good Old Days Bias

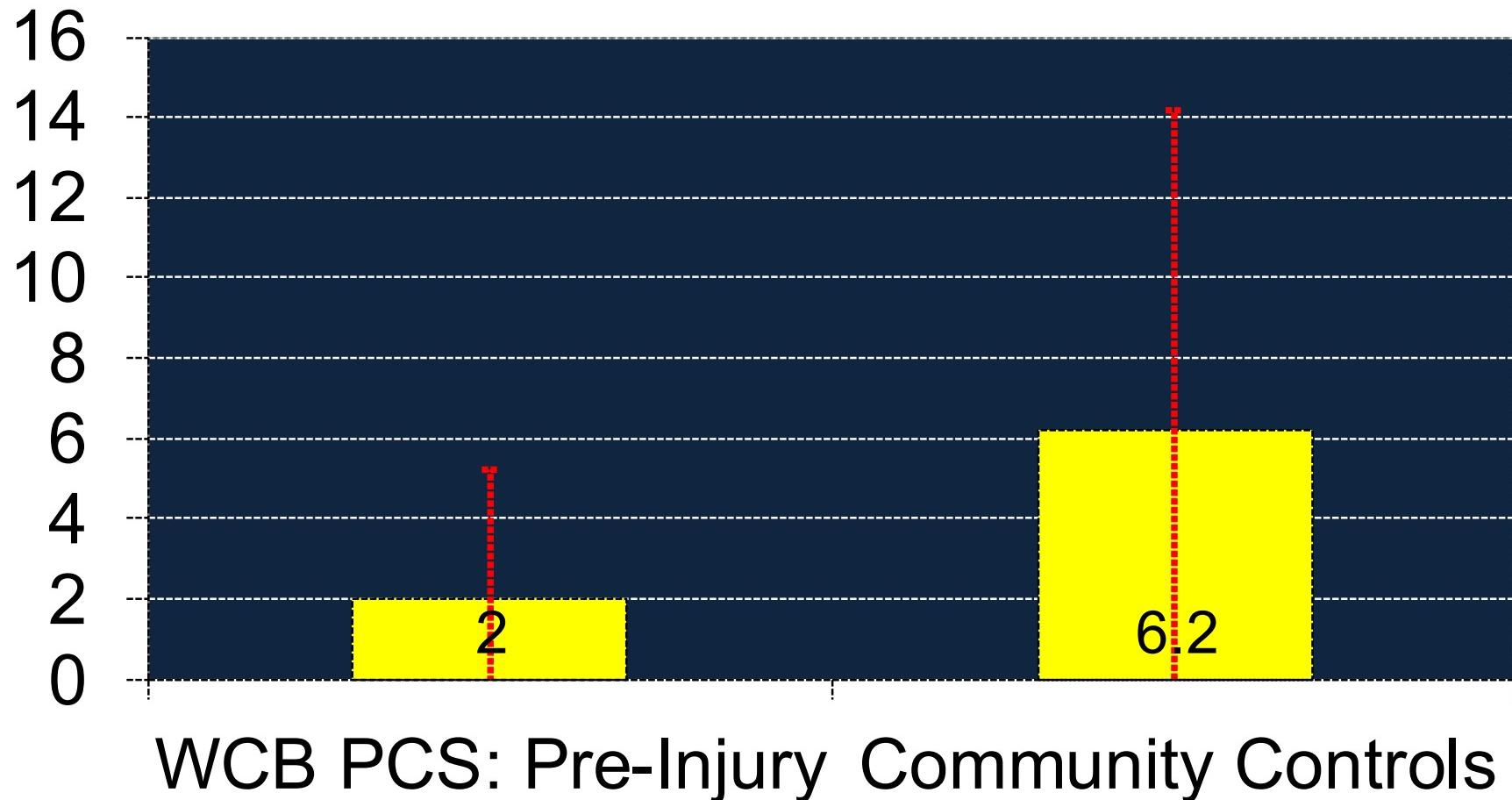
- The tendency to view oneself as healthier in the past and under-estimate past problems is referred to as the “good old days” bias.
- Researchers have reported that some patients with a history of MTBI and/or who are involved in litigation report fewer symptoms and problems than healthy adult control subjects.

Retrospective vs. Current Symptom Ratings

- WCB patients with Post-Concussion Syndrome (N=90) asked to retrospectively rate their pre-injury symptoms
- Healthy controls and university students (N=177) asked to rate their current symptoms

Iverson, Lange, Brooks, & Ashton (2010)

Pre-Injury Retrospective Symptom Reporting vs. Current Symptom Reporting



#3

Some people exaggerate symptoms
and/or deliberately under-perform on
neuropsychological testing

Relation Between Poor Effort & Symptom Reporting

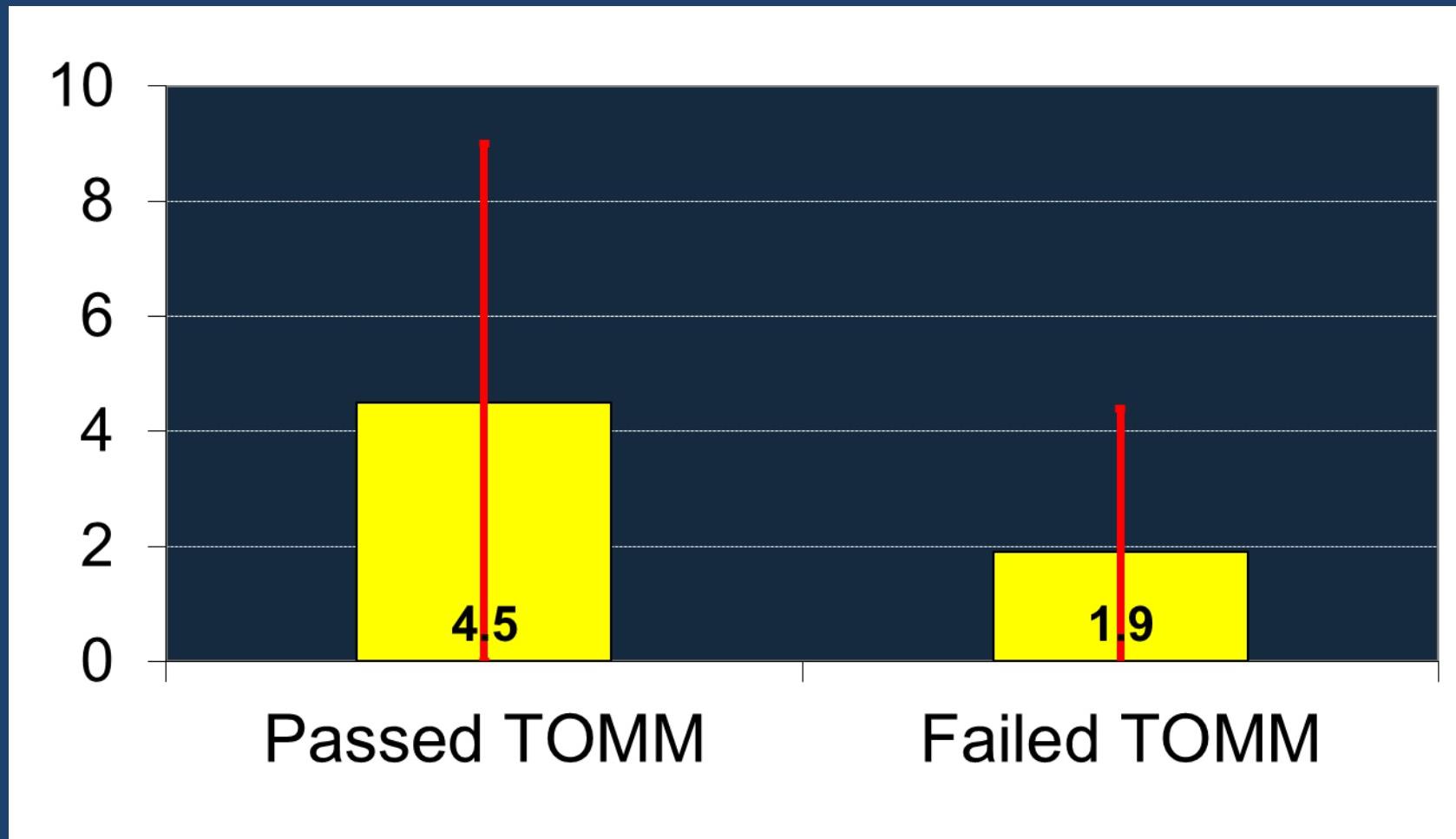
- Worker's Compensation Patients
- N=59
- All with MTBIs
- Age = 42.3 (SD = 11.7)
- 68% Men; 32% Women
- 1.9 Months Post Injury (SD = 1.0)

Test of Memory Malingering (TOMM)

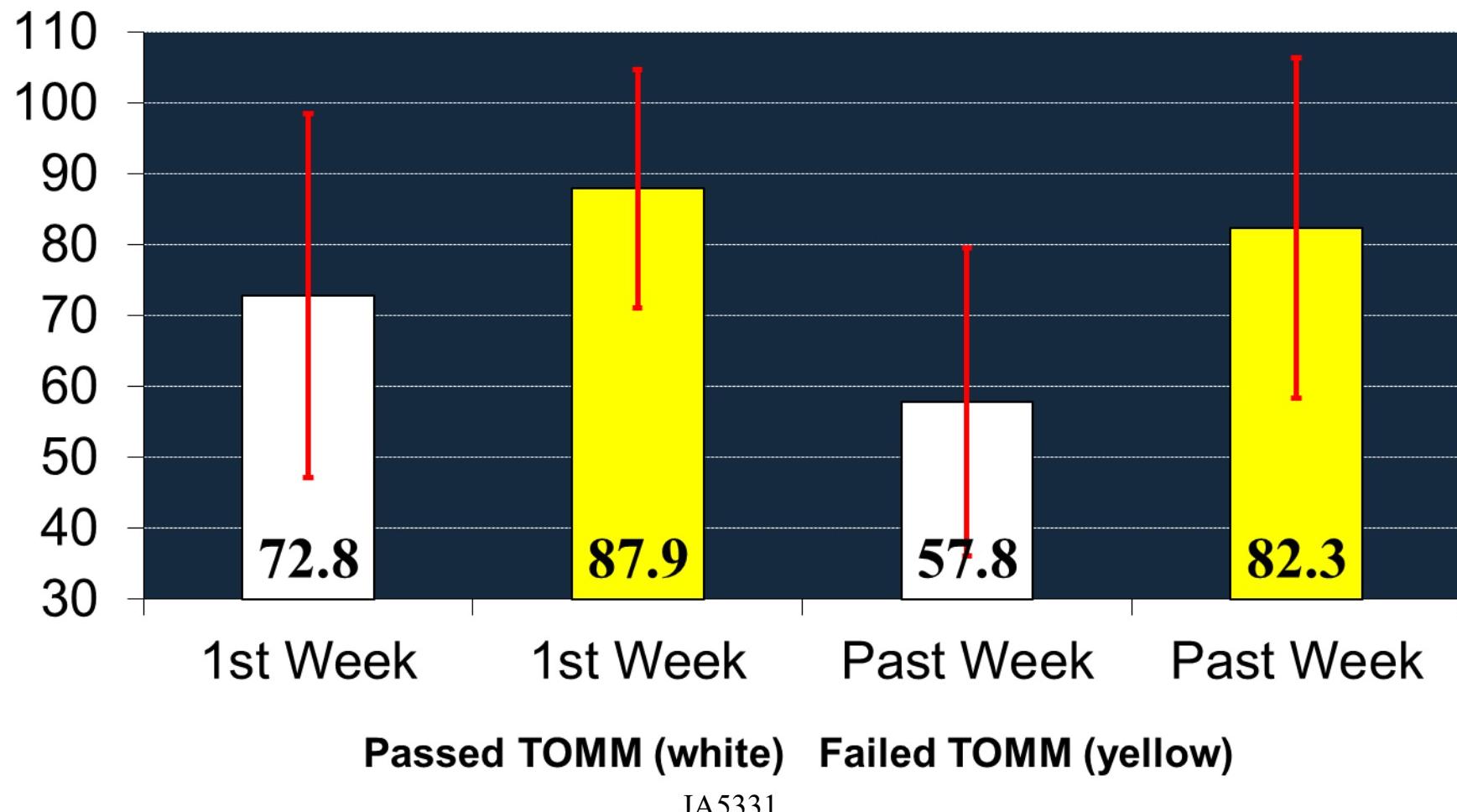
Effort Test

25% Failed

Pre-Injury Symptom Ratings



Total Symptom Reporting

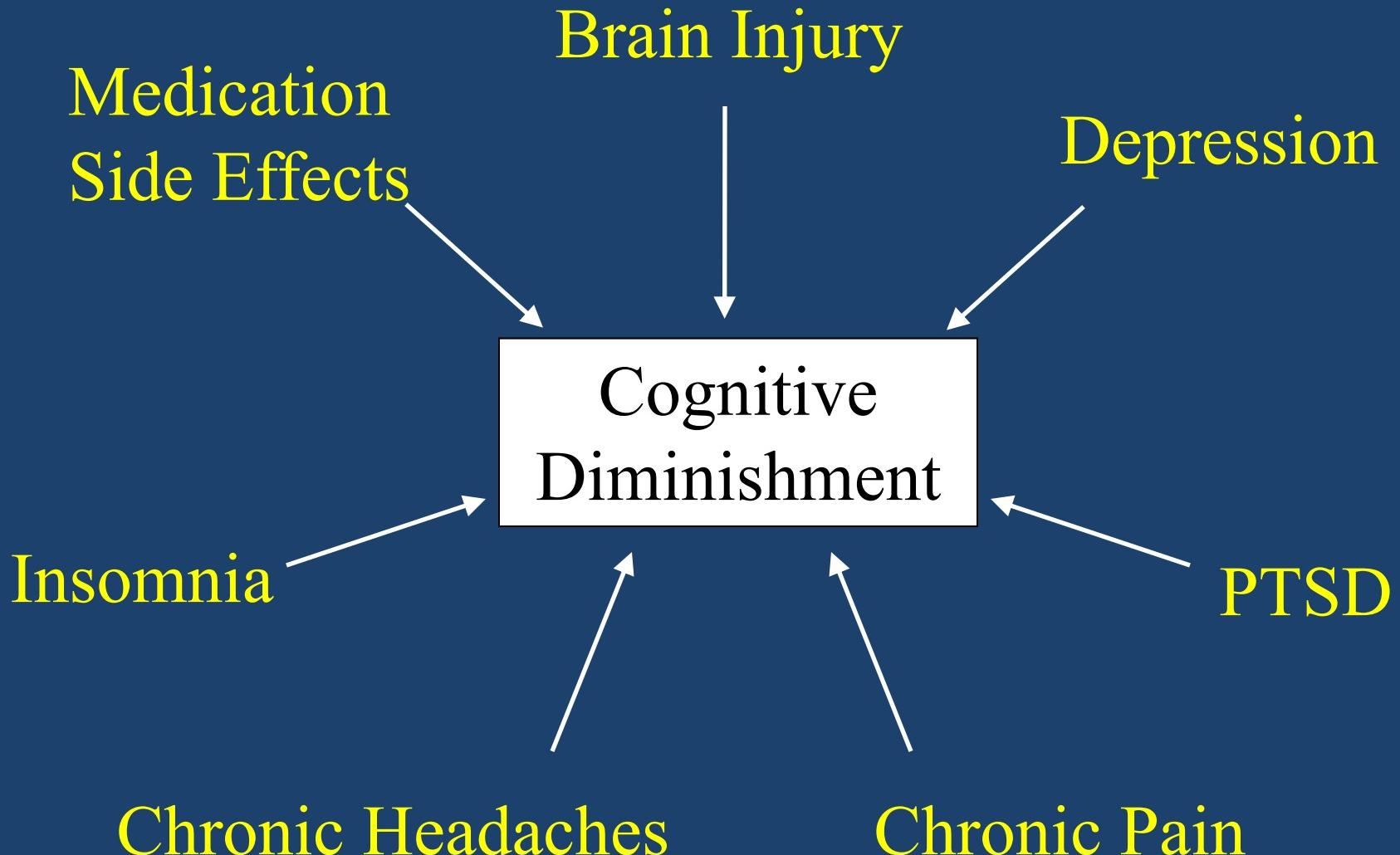


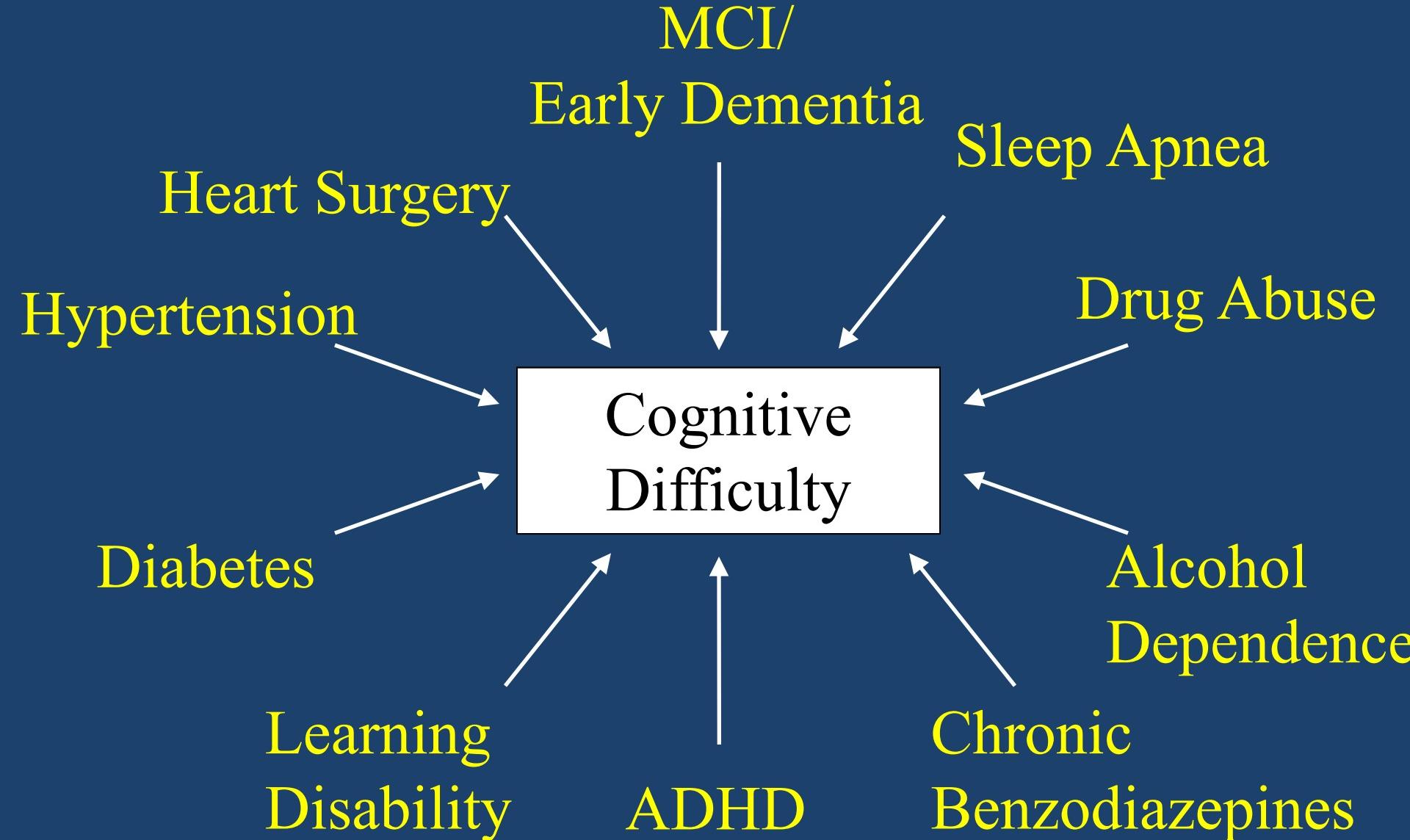
#4

Can Neuropsychological Assessment Accurately Detect Long-Term Cognitive Problems Clearly Attributable to an MTBI?

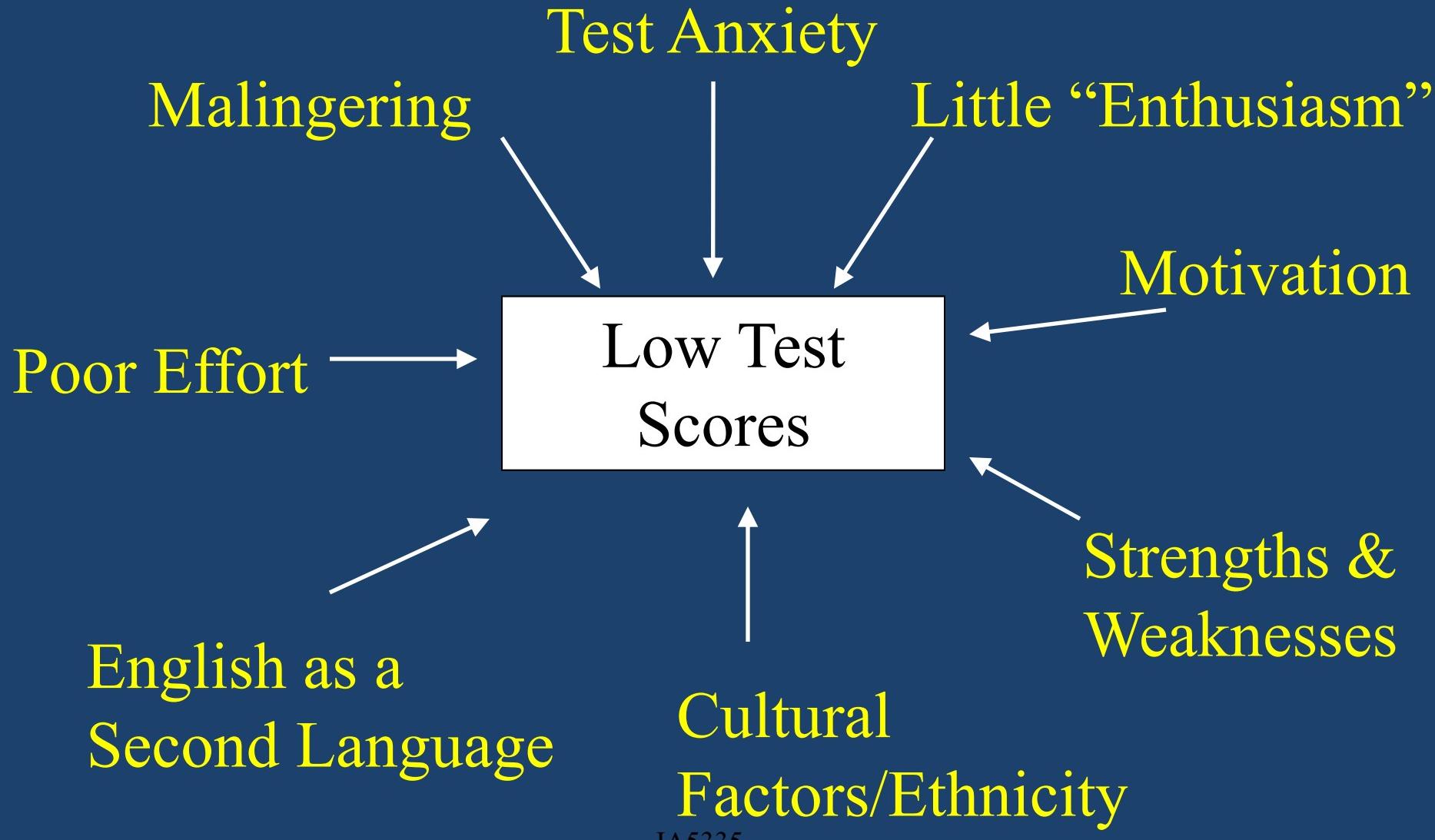
Usually not (but sometimes, if there
are few confounding factors)

Possible Effects on Cognition





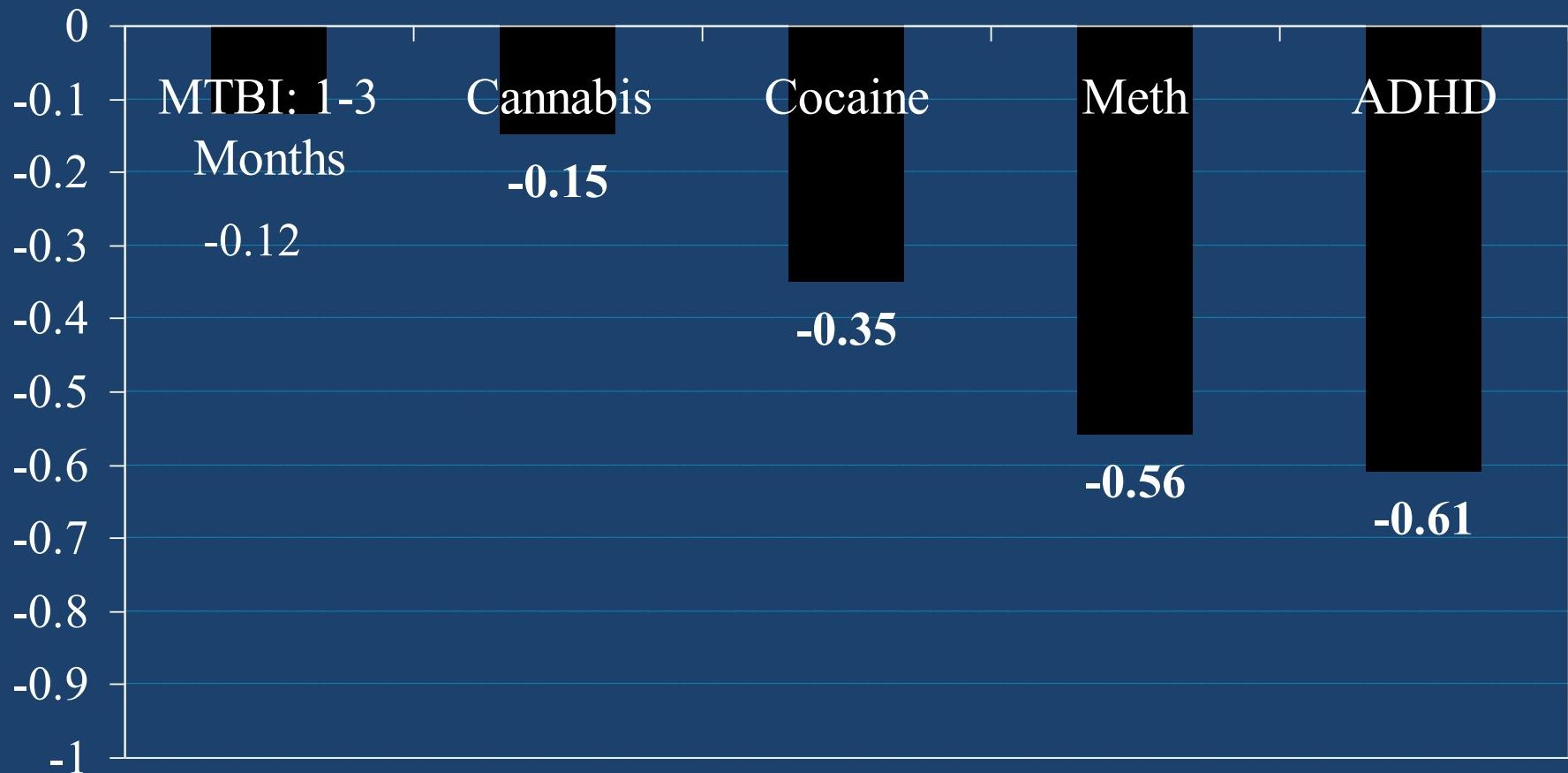
Factors Affecting Test Performance



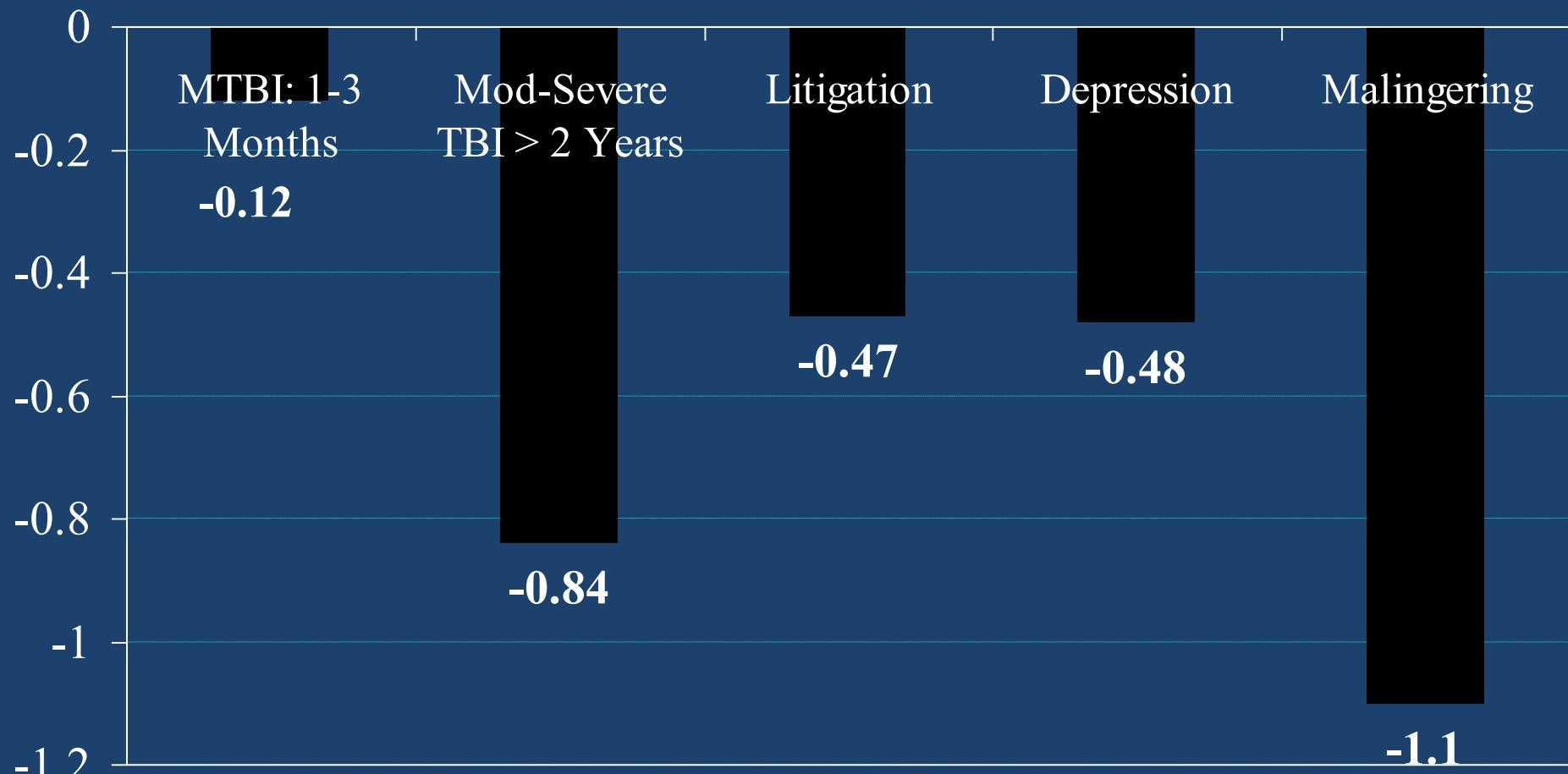
Overall Effects of Poor Effort on Neuropsychological Functioning?

Results from Meta-Analyses

Adverse Neuropsychological Effects



Adverse Neuropsychological Effects



#5

It is easy to misdiagnose
cognitive impairment

How Do You Define Impairment?

- Scores below the 16th percentile (1 SD)?
- Scores below the 10th percentile?
- 5th percentile?
- 2nd percentile (2 SDs)?

Prevalence of Low Scores in Healthy Adults?

- Most neuropsychologists don't know
- Higher the cut-off, greater the number of low scores
- More tests you give, the more likely you are to get low scores

Neuropsychological Assessment Battery (NAB)

- Takes approximately 3.5 hours to administer
- 24 tests
- 36 Primary Test Scores
- MANY additional test scores

Impairment = 5th Percentile

- What percentage of healthy adults have one or more low scores?

70%

- 3 or more? 31%

- 5 or more? 16%

Impairment < 1 SD (16th percentile)

- What percentage of healthy adults have one or more low scores?

92%

- 3 or more? 66%

- 5 or more? 44%

Misdiagnosis of Cognitive Impairment

- Longstanding strengths and limitations
- Pre-existing conditions
- Co-occurring conditions
- Confounds (e.g., effort, fatigue, or cultural factors)
- Low scores are common in healthy adults
- Capitalizing on chance findings

#6

In recent years, evidence-based algorithms have been developed for more accurately identifying cognitive impairment

Unfortunately, most neuropsychologists are not aware of these developments

Domain-Specific Base Rates

That is: The Prevalence of Low Scores in
Healthy Adults by Specific Cognitive
Domain

Processing Speed: WAIS-IV

(Coding, Symbol Search, Cancellation)

- Scaled Score = 7 or lower (16th percentile)
 - 1 or more low scores = 36.3%
 - 2 or more low scores = 17.4%
 - 3 low scores = 5.5%
- Scaled Score = 5 or lower (5th percentile)
 - 1 or more low score = 12.8%
 - 2 or more low scores = 3.9%
 - 3 low scores = 0.7%

Working Memory: WAIS-IV

(Digit Span, Arithmetic, Letter Number Sequencing)

**Scaled Score = 7 or lower
(16th Percentile)**

- 0 low scores = 68.2%
- 1+ low score = 31.8%
- 2+ low scores = 13.7%
- 3 low scores = 5.0%

**Scaled Score = 5 or lower
(5th Percentile)**

- 0 low scores = 90.2%
- 1+ low score = 9.8%
- 2+ low scores = 2.9%
- 3 low scores = 0.6%

Raising the criterion for a low score
in high functioning people
(25th percentile?)

Patient who is 5 Days Post Injury (High Average IQ)

- WAIS-IV Working Memory
 - Digit Span = 11 (63rd percentile)
 - Arithmetic = 8 (25th percentile)*
 - Letter Number Sequencing = 8 (25th percentile)*
- Probability in Healthy Adults With High Average IQs = 2.5%*

Patient 5 Days Post Injury

(High Average IQ)

- WAIS-IV Processing Speed
 - Coding = 8 (25th percentile)*
 - Symbol Search = 10 (50th percentile)
 - Cancellation = 8 (25th percentile)*

Probability in Healthy Adults with High
Average IQs = 12.7%*

Conclusions

- Neuropsychological Assessment relies heavily on self-reported symptoms and cognitive testing
- Symptoms and cognitive testing can be influenced by many factors
- Healthy people get some low scores on neuropsychological testing
- There are new statistical methods for identifying cognitive impairment more accurately

Thank you

EXHIBIT 7

NFL CONCUSSION LAWSUITS

An  Anapol Schwartz Information Website

NFL Concussion Lawsuit News | Contact & Locations | Full NFL Lawsuit Complaint

(888) 209-2626

NFL CONCUSSION LAWSUITS

NFL CONCUSSION LAWYERS

CONCUSSION SYMPTOMS

TRAUMATIC BRAIN INJURY

CHRONIC TRAUMATIC ENCEPHALOPATHY

Chronic Traumatic Encephalopathy (CTE) is a progressive degenerative brain disease commonly found in athletes with a history of concussions and other brain trauma.



Repetitive head trauma triggers progressive degeneration of the brain tissue that can begin decades after the last incident, according to an article by the Center for the Study of Traumatic Encephalopathy at the Boston University School of Medicine and Sports Legacy Institute.

Symptoms of CTE include dementia, aggression, depression, memory loss, confusion, impaired judgment and impulse control problems.

After former San Diego Charger Junior Seau shot himself in the heart in May 2012, researchers found he had suffered from CTE. An autopsy report of former Atlanta Falcons player Ray Easterling, who committed suicide after filing the first

federal NFL concussion lawsuit with attorneys Sol Weiss and Larry Coben, found that he also had CTE. Easterling played for the Falcons for eight seasons in the 1970s and suffered from dementia and depression for years after he retired.

Dozens of deceased former players were also found to have had the degenerative condition, a conclusion made by brain specialists consulted by the National Institutes of Health in Washington.



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This website is dedicated to providing public information regarding Concussions lawsuits and other legal information. None of the information on this site is intended to be formal legal advice, nor the formation of an attorney-client relationship. Please contact Sol Weiss and Larry Coben for information regarding your particular case.

ABOUT US



The attorneys at Anapol Schwartz have many years of experience with the complexities of multidistrict litigation and are dedicated to helping people like you.

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Judge Grants Preliminary Settlement Approval in NFL Concussion Lawsuits

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Anapol Schwartz Announces \$765 Million Proposed Settlement with NFL

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NATIONAL FOOTBALL LEAGUE CONCUSSION LITIGATION

JA5358

The United States Panel on Multi-District Litigation (JPMDL) recently issued an order consolidating all of the cases which have been filed in the National Football League Players' Concussion Injury Litigation and assigning them to the Honorable Anita B. Brody in the United States District Court for the Eastern District of Pennsylvania. Gene Locks was among those who argued before the panel for the assignment of the litigation to Philadelphia and with its primary office in that City the Locks Law Firm is positioned to play a major role in the litigation.

The Firm filed one of the first class action lawsuits in the country, in the Eastern District of Pennsylvania, seeking to compel the NFL to provide medical monitoring for repetitive concussion and cumulative head trauma for former players who are or could in the future be victims of the repetitive traumatic brain injury they sustained while playing in the NFL. The Locks Firm has also filed separate lawsuits on behalf of former NFL players seeking damages, treatment and medical monitoring for the neurological injuries those players sustained during their NFL careers. The Locks Law Firm is committed to obtaining complete and valid treatment, medical monitoring and all appropriate damages for victims and their families. The investigation into this problem has revealed that repetitive traumatic brain injuries sustained by former NFL players during their careers is pervasive and possibly an epidemic.

In our view, the NFL in the past has failed to address this problem, attempted to diminish its importance, and actively sought to dispute the connection between latent brain disease and repetitive traumatic brain injury sustained by NFL players. At no time was this conduct in the best interests of the players or their short-term and long-term neurological health. Rather than implement a system that put the players' short-term and long-term health as the NFL's primary concern, the NFL obfuscated, minimized, and even falsified the risks of repetitive head trauma. The NFL now treats these injuries legally as a "workman's compensation issue".

Brain injuries are among the most debilitating personal injuries any victim can sustain; their consequences are often progressive, permanent, and sometimes fatal. They affect not only the injured person, but family members and close friends as well. For many years, all credible scientific evidence leads to the conclusion that individuals who suffer repeated and cumulative trauma to the head are at significantly increased risk for permanent brain injuries. All NFL players are therefore at increased risk.

The Locks Law Firm is internationally recognized for its representation of brain injured victims, as well as its representation of mass torts victims. You may participate in this lawsuit at no cost to you or your family. There may be time limits which govern your ability to sue, so you should speak with an attorney about this matter as soon as possible. If you would like us to represent you, please complete and submit the questionnaire below and answer the questions.

* indicates a required field

First Name:
 Last Name:
 * Address me as:
 * Email:
 Date of Birth:

Address: Home Phone:

Work/Cell Phone:
 Marital Status:
 Spouse's Name:

Please identify each NFL team with which you were employed and the dates when you were employed by each team.

Please identify each position you played while employed by an NFL team and the dates you played the position identified.

Have you ever sustained or experienced a concussion or concussion-like symptoms during practices, workouts, and/or games while employed by any NFL team?

Yes

No

If the answer is yes, please identify each instance when you sustained or experienced a concussion or concussion-like symptoms of any kind, and please provide the approximate year (and possibly month) and with what teams were you employed at that time.

JA5359

Have you ever seen a physician or medical professional about any concussion, concussion-like symptom, persistent headaches, dizziness, and/or inability to concentrate and/or any other issue that you believe is related to concussions, concussion-like symptoms?

Yes

No

If the answer is yes, please identify the physician(s) and/or medical professional(s) you have seen about any concussion, concussion-like symptom, persistent headaches, dizziness, and/or inability to concentrate. Hospital/Facility Name, State, Zip, Phone:

Physician or Medical Provider Name, State, Zip, Phone:

Have you ever been hospitalized in connection with a concussion, concussion-like symptom, persistent headache, dizziness, and/or inability to concentrate?

Yes

No

If the answer is yes, please identify the hospital or clinic in which you received treatment and the approximate year and month when the

treatment took place. Hospital/Facility Name, State, Zip, Phone:

Surgeon's Name, State, Zip, Phone:

Please provide a brief summary of any current issues, concerns and/or problems you believe are in any way related to concussions,

concussion-like symptoms, and/or head trauma you sustained while playing for any NFL team.

Accept retainer agreement ([click here for full agreement](#)):

Yes

No

Experienced, Aggressive Legal Representation

JA5360



The personal injury attorneys at the Locks Law Firm have decades of courtroom experience which they are ready to put to work in your case. Throughout Philadelphia, New York and New Jersey, our personal injury attorneys have earned reputations as tough, dedicated litigators who zealously advocate for the legal rights of their clients. We have a [proven history of earning large jury verdicts and negotiated settlements](#) for our clients.

Representing Victims Throughout the Northeast

The Locks Law Firm has offices conveniently located in [Philadelphia, Pennsylvania](#); [Cherry Hill, New Jersey](#); and [Manhattan, New York City](#). Our personal injury attorneys are well positioned to meet with and represent clients across the Northeast. We are a large, diverse law firm representing clients in a variety of legal cases. Our experience and dedication to the rights of our clients is unmatched.

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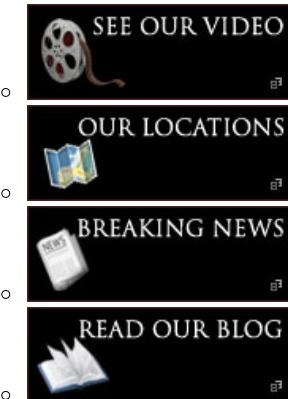
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The Pennsylvania, New York, and New Jersey personal injury attorneys at the Locks Law Firm are vastly experienced at helping clients receive large financial awards to compensate them for their injuries. Schedule a free, no-pressure and confidential case evaluation and consultation today.

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EXHIBIT 9



ESPN.com: OTL

[\[Print without images\]](#)

Monday, September 29, 2014
 Updated: September 30, 12:29 PM ET

OTL: Belcher's brain had CTE signs

By Steve Delsohn
 Outside The Lines

The brain of former [Kansas City Chiefs](#) linebacker Jovan Belcher -- the 25-year-old player who shot and killed his girlfriend in 2012 before committing suicide -- showed signs of pervasive brain damage like that found in other deceased NFL players, according to a neuropathologist.

In a report obtained by "Outside the Lines," Dr. Piotr Kozlowski writes that he detected neurofibrillary tangles of tau protein, which is identified with chronic traumatic encephalopathy. The tangles were distributed throughout Belcher's hippocampus, an area of the brain involved with memory, learning and emotion.

Dozens of former NFL players have been diagnosed posthumously with CTE, a neurodegenerative disease linked to dementia, memory loss and depression. The disease, researchers say, is triggered by repeated head trauma.

On Dec. 1, 2012, Belcher [shot and killed girlfriend](#) Kasandra Perkins, the mother of his then-3-month-old daughter. Belcher then drove to the Chiefs' practice facility, where he shot himself in front of team officials in the parking lot. While the murder-suicide reignited the debate over athletes and guns, it also increased the focus on a frequently overlooked issue at the time: the NFL's domestic violence problem.



Jovan Belcher fatally shot his girlfriend, Kasandra Perkins, multiple times before killing himself at Arrowhead Stadium on Dec. 1, 2012.

Belcher's [body was exhumed](#) one year after his death, and his brain was examined two weeks later. Kozlowski was hired to diagnose the brain by court-appointed Kansas City attorneys who represent the interests of Belcher's daughter. Belcher's mother, Cheryl Shepherd, initiated the process of exhuming her son's body to have his brain studied, attorney Dirk Vandever said.

Vandever declined to comment about why his law firm released Kozlowski's findings now, almost nine months after the diagnosis. "Outside the Lines" requested copies of images of Belcher's brain to send to another neuropathologist for independent analysis, but that request was denied.

Neurosurgeon Dr. Julian Bailes, chairman of the department of neurosurgery and co-director of the NorthShore Neurological Institute in Chicago, did not study Belcher's brain but said of the possible findings: "It is of great interest. Violence against others is not typically part of the CTE picture. But it was in the case of [\[former professional\] wrestler Chris Benoit](#). It would be nice to have these findings corroborated."

"If correct, they're very compelling."

JA5363

If it can be shown that Belcher did have CTE, Belcher's daughter and mother, together, would be eligible for up to \$4 million under the proposed concussion settlement between the NFL and former players. Furthermore, the lawyers representing Belcher's daughter have filed a wrongful-death lawsuit against the Chiefs on her behalf. Belcher's mother, with different attorneys, [filed an almost identical suit](#).

Among the allegations contained in the lawsuits is that Belcher was knocked unconscious during a game against the [Jacksonville Jaguars](#) in 2009 and did not receive adequate treatment. The lawsuits also refer to a November 2012 game against the [Cincinnati Bengals](#) when, the lawsuits allege, Belcher "suffered what should have been recognized as an acute concussion." However, one lawsuit continues, "despite exhibiting obvious symptoms, Decedent was never removed from play for evaluation and recovery." The lawsuits also claim Belcher exhibited signs of CTE, including changes in his mood and behavior.

"The NFL has a long history of changing the rules of the game to make it safer on the field, providing players the best medical care, and updating protocols on diagnosing concussions, treating concussions, and returning to play after a concussion," the league said in a statement.

The NFL said it has funded \$161 million in CTE and related research projects, including a \$30 million grant to the National Institutes of Health in 2012.

The Chiefs declined to comment.

Kozlowski, through Vandever, was not made available for comment. According to the American Board of Pathology, he is certified in anatomic pathology and neuropathology. He was formerly a program director at the National Institutes of Health Institute for Neurological Disorders and Stroke in Maryland. Kozlowski serves as the dean of research and pathology professor at the Touro College of Osteopathic Medicine in New York City.

Vandever said Belcher's mother had the idea of having her son's brain studied after reading multiple reports about football players and CTE. He declined to discuss why Kozlowski was chosen as opposed to researchers who are more experienced in the study of CTE and football players -- those from Boston University and the NIH, for example.

As for Belcher's brain being examined slightly more than a year after his death, Kozlowski's report refers to some brain decomposition, with certain parts better preserved than others. Bailes said it is possible to find evidence of tau protein and CTE-like changes a year after a death.

Bailes, who has studied the connection between football players and head injuries, worked on the case of Andre Waters, a former Philadelphia Eagles safety who committed suicide by shooting himself in the head. "Even in this case of a gunshot wound to his brain, it was possible to diagnose him with CTE," Bailes said of Waters.

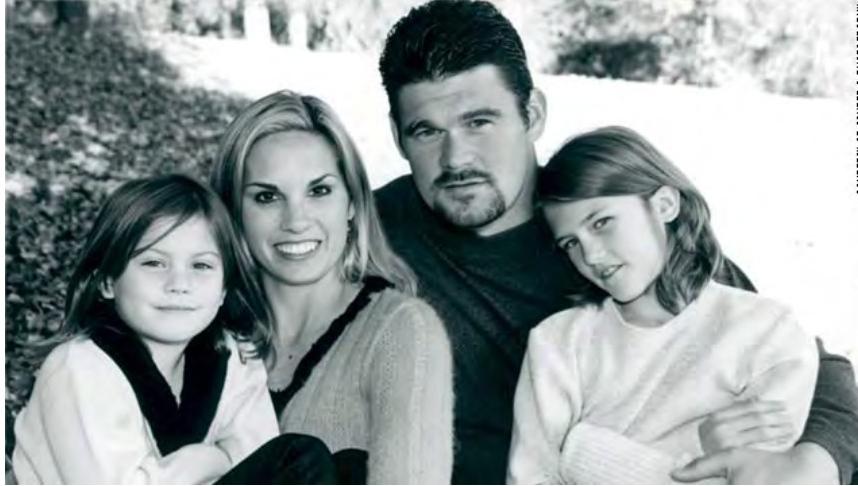
Steve Delsohn is a reporter in ESPN's Enterprise/Investigative Unit and can be reached at stevedelsohn@aol.com.

EXHIBIT 10

Ex-Falcons lineman had brain disease linked to concussions

By Stephanie Smith, CNN Medical Producer
April 1, 2011 11:48 a.m. EDT

CNN.com



COURTESY OF SHANIE O'PHOTOGRAPHY

Editor's Note: Dr. Sanjay Gupta gets a candid look at the mental deterioration of a former NFL player and the toll that chronic traumatic encephalopathy can take on a family on "[Sanjay Gupta, M.D.](#)" at 7:30 a.m. ET Saturday and Sunday.

(CNN) -- Former NFL lineman Shane Dronett's transformation from an affable prankster, quick to flash a wry smile, to a person who was often frightened -- and frightening -- was subtle at first.

It began in 2006, with a bad dream.

"He woke up in the middle of the night and started screaming and told everyone to run out of the house," said Chris Dronett, Shane Dronett's wife. "He thought that someone was blowing up our house. It was very frightening."

Chris tried to dismiss the incident as isolated, except that two weeks later, there was another outburst, then another, until they were an almost-nightly occurrence. And as Shane's fear and paranoia began overwhelming him, so did episodes of confusion and rage that sometimes turned violent.

Only three years after retiring from the NFL in 2006, Shane was suffering. The tragic culmination of his pain came when he committed suicide in 2009 at 38.

Scientists at the Boston University School of Medicine's Center for the Study of Traumatic Encephalopathy tested Shane's brain tissue and confirmed that before he died he was suffering with a brain disease -- chronic traumatic encephalopathy -- that seems to afflict football players.

"There is evidence of CTE in his brain making him yet another former NFL player who had definite CTE," said Chris Nowinski, co-director of the traumatic encephalopathy center. Nowinski said the center has found evidence of CTE in the [brains of 13 of 14 former NFL players](#), including Dronett.

Usually found in much older dementia patients, CTE is an accumulation of an abnormal protein in the brain called tau, which is associated with repeated head traumas -- concussions or subconcussive hits -- that are not allowed to heal. CTE can also diminish brain tissue and is associated with memory loss, depression, impulsive behavior and rage.

Outrage comes out of nowhere

The Dronetts' daughter recalled an incident at a local burger joint: "He was ordering, and he got mad at (an employee) and just punched him in the face," said 16-year-old Hayley Dronett.

"He thought the guy was shaking the ice weird or something, and he took him down in the restaurant," added Chris.

JA5366



Duerson asked for brain to be studied



New NFL tests for concussions

It was all uncharacteristic for a man whom Chris described as "someone who would light up the room," outgoing, affable, funny. It was incongruous behavior for a father who had been involved and close with his two daughters -- taking them four-wheeling, volunteering at school, even painting their fingernails.

"He was just the best dad in the world," said Hayley.

Researchers believe that the battering Shane Dronett took as an NFL lineman -- and the hits he accumulated over two decades of playing -- might explain his brain's deterioration.

"What we know is that by definition, a lineman will have their head hit almost every play of every game and every practice," said Dr. Robert Stern, co-director of the BU CSTE. "The estimates are around 1,000 or more hits for a lineman every season."

It might have been the accumulation of tens of thousands of subconcussive hits -- which might not result in overt concussion symptoms such as dizziness, short-term memory

loss and confusion but could still cause brain damage -- that finally took a toll on Shane.

"I think the issue is that the brain was not meant to be hit even subconcussively 1,000 times a year," said Stern.

The NFL would not comment about Shane's case specifically, but it emphasized that the league supports the BU center's work and that it continues to take steps limit contact to the head and to ensure that concussions, when they occur, are properly treated.

10 hard seasons of hard hits

Shane played for 10 seasons, first with the Denver Broncos and then the Atlanta Falcons. He played defense on the 1998 Falcons team that had a storybook Super Bowl run.

Chris said her husband never let a concussion deter him.

"Shane didn't come out of games because he always said NFL players are so expendable," said Chris. "And if you're not out there, the next guy will be."

[Kurt Warner: Playing with concussion "part of the game"](#)

Shane played through dizzying hits.

"There were times when he'd be slow getting up and kind of try to shake it off and get back in there," said

Case 2012md22303 AP 00311821058655 14 File#12/02/14 Page#08092010
Chris. "He would have headaches and he would say, 'I wish someone would split my head open with an ax and relieve the pressure,' but it wasn't even an option to come out (of the game)."

Could a tumor explain his behavior?

When Shane was found to have a brain tumor in 2007, at the height of his unorthodox behavior, it was actually a glimmer of hope for his wife.

"I was almost relieved because I was thinking, 'OK, here is the answer to why he's acting like this, because he had a tumor,'" said Chris. "And then after he recovered from the tumor being removed, he was back to the same symptoms of paranoia."

Shane's neurosurgeon said that he most likely had the tumor all his life and that the benign growth could not explain his behavior, Chris said.

Researchers at BU CSTE call the brain tumor potentially confounding, but most likely not a factor in Shane's behavior.

"There's no way we would ever know what was specifically caused by the tumor or the surgery for the tumor or CTE," said Stern. "But more than likely at least some of his behavior and symptoms were associated with the worsening of the CTE."

The reasons for Shane's behavioral changes soon became secondary to a bubbling fear for his wife and daughters. It came to a head during a ski trip that Chris took with her daughter Hayley in January of 2009.

"He called us 100 times a day, wondering where we were and we'd tell him we're in Utah ... and he just didn't believe it," said Chris. "He thought people were driving around the house and he was wondering who had been following him that day. It was just very scary."

Shane was supposed to pick up his family at the airport but never showed up. The next morning, Chris encountered her husband in the hallway of their home, brandishing a gun.

"I saw the gun, and I ran out the front door," said Chris. "He had gone into the kitchen, and as soon as I put my hand on the front door, I heard it."

What Chris had heard was the firing of the gun that killed Shane when he turned the gun on himself.

In a moment, months of consternation and abject fear ended, giving way to profound sadness for a family that, even as they waded through the mire of Shane's condition, could not have foreseen this end.

"He was always so full of life," said Chris. "Even his darkest moments, I just still never imagined that he would do that."

Two years removed from the terrible events of that January morning, Chris finds some solace knowing that a brain disease that could explain why she and her daughters lost Shane.

"I had nowhere to turn. I didn't know anything about (CTE). I didn't know other players were going through this type of stuff," said Chris. "I think if Shane knew at the time how serious (playing through concussion) could be down the road, he would have backed off."

Chris is heartened by [rules changes and progress at the NFL level](#), but chafes when she hears about players who oppose those changes.

JA5368

"I know a lot of the players are against that, but they're young and they haven't seen what I've seen," said Chris.

Chris says that if she could speak directly to players, "I would tell them what I went through, what Shane went through and what other people I know have gone through and then let them make that decision. Because I feel like they're making their statements without being educated."



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EXHIBIT 11

Ad

Morning Mix

Study finds a strong correlation between repeated head trauma and domestic abuse



By Soraya Nadia McDonald October 22  [Follow @SorayaTWP](#)

Mary Ann Easterling, widow of former NFL safety Ray Easterling, told HBO Sports her husband became abusive, something she believes was a result of chronic traumatic encephalopathy. (AP Photo/Matt Rourke)

Perhaps the NFL should start watermarking its player contracts with a skull and crossbones or, at the very least, a warning from the surgeon general.

Following Tuesday night's "Real Sports" report on the link between domestic violence and chronic traumatic encephalopathy, the brain disease brought about by repeated concussions, there's a question of whether such a gesture would seem remotely adequate as a warning of possible prognosis of the disease.

HBO revealed the results of a 2013 study of brains of CTE victims conducted by Boston University, which, in tandem with the Sports Legacy Institute, specializes in studying the disease. The study of 33 men, authored by Robert Stern, found that more than 50 percent had never been violent prior to sustaining head injuries.

In just five years of playing in the NFL, Paul Oliver suffered three major concussions — and that was enough to radically alter his personality and turn him into someone his wife Chelsea, did not recognize.

She called him a monster.

“His behavior started to change and one example was we got in an argument and he shattered all our phones so I couldn’t call the police and locked all the doors,” Oliver told Jon Frankel of “Real Sports.” “He told me if I got up off the couch that he would slam my head into the floor.”

When understood as rarefied-but-horrific instances, they’re troubling, but easier to write off. He was a bad guy. An exception. An anomaly.

But Oliver’s experience with domestic violence as an NFL wife wasn’t an exception. Her experience with an enraged partner who sabotaged any effort to contact law enforcement echoed that of Dewan Smith-Williams, estranged wife of former NFL offensive lineman Wally Williams. Like Oliver, Smith-Williams was one of the few women willing to come forward. She [gave an account to The Washington Post](#) of an episode with her husband: “I called the police and he snatched the phone from me,” Smith-Williams. “I called from other phones, and he would

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Oliver, Smith-Williams and Mary Ann Easterling — Ray Easterling's widow — are just a few of the women comprising a sorority whose members were muscled into the shadows by the NFL, they maintain.

Over and over, they cite the NFL's culture of silence which prioritizes the league, its success, revenue, and reputation above all else. It's encapsulated in one telling phrase that has come to follow commissioner Roger Goodell's handling of the crises that were dominating discussions of the league: "Protect the shield."

Sure, he was doing his best to "protect the shield," but at what cost? And to whom?

HBO Sports spoke to 10 NFL wives who said their previously peaceful husbands became violent after repeated head trauma, but they didn't want to speak on camera. Chris Nowinski of the Sports Legacy Institute told Frankel he hears from them. They found Easterling. They found Smith-Williams.

And their stories are disturbingly similar.

Asked to provide a sampling of the e-mails he gets from player wives, Nowinski responded: "I'm scared for my life. My husband played 12 years of football and he was a loving man and now he has been stalking me and he's been violent with me — fifty exclamation points — help me. It's dozens of these e-mails come in all the time. We'll see

violence going forward because we're sending very big,

very brain damaged people out into the community."

What now? As it stands, women feel they're risking their safety by coming forward. They don't feel supported or even heard by the NFL or their own communities. Will the NFL construct a mechanism to allow women to safely report domestic violence and suspicions their partners may have CTE? Well, first it has to be willing acknowledge that such a link exists.

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"One on one, wives will share that," Easterling said. "When they know there's not a possibility of being threatened, they will share it out of earshot of their husbands."

Then there's the question of punishment. Is it ethical to punish a person for behaving in a way that is out of their control? In the case of CTE, incarceration doesn't do anything to solve the source of the violence. Involuntary actions are undeterred by the threat of jail time.

"We're not saying that what they're doing is not wrong and they shouldn't be punished like anybody else, but what we are saying is that we have to acknowledge the fact that the seat of some of this behavior might be the damage that we're doing to their brains," Nowinski said.

Ann McKee of Boston University told "Real Sports" when she received Oliver's brain, it contained lesions in the anterior temporal lobe. "Those areas are the parts of the brain that are concerned with emotionality and assaultiveness and ability to control ourselves," she said. JA5374

"You mean that as the disease progressed, he lost the ability to control himself?" Frankel asked.

"Yeah," McKee said. "That's a pattern we've seen over and over again."

Then there's the matter of those yet to enter the NFL, but who, as high school and college athletes, have already been identified and groomed for a football career.

How do you get an 18 or a 22-year-old to understand that a chance to convert a childhood passion into paydirt poses a danger not just to his body, but possibly to the very essence of who he is? On top of that, he's expected to weigh the fact that said decision not only affects him, but a family he may not even be able to conceive of one day having.

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All of that is now up for consideration for prospects still in the stages of advanced adolescence. And who, when they're young and invincible, wants to believe that suicide or Lou Gehrig's disease or Alzheimer's is part of their future? After all, they've arrived at this juncture because they've lived their lives as exceptions, genetic freaks of nature faced with the opportunity to cash in the chip that makes them special.

If you're a wide receiver on the precipice of a life that comes with more money than you've ever seen before, is it so far of a stretch to think: *Maybe I can outrun this, too?*

And if you can't, is there any amount of money that makes

Soraya Nadia McDonald covers arts, entertainment and culture for the Washington Post with a focus on race and gender issues.

EXHIBIT 12



ESPN.com: NFL

[\[Print without images\]](#)

Thursday, May 2, 2013

Lives after Junior

By Shelley Smith
ESPN

INSIDE A RUN-DOWN, but clean gym tucked away on a small back street in Oceanside, Calif., a beach city about 80 miles south of Los Angeles, 79-year-old Tiaina Seau walks steadily on a slow-moving treadmill. His wife, 75-year-old Luisa, patiently pedals an outdated stationary bicycle.

This morning in mid-April is just like all the others they spend at the Junior Seau Fitness Center, a building next to the Oceanside Senior Citizens Center and across the street from the Boys & Girls Club. It's not the well-known gym in the middle of town on Mission Avenue, where Junior would often work out with his close friend Jay Michael Auwae, a Marine whom Junior met after retiring from a 20-year career. But a quiet, discreet building, not an easy place to find. And that's why Junior would come here religiously once he left behind his high-profile life in the NFL, often playing ukulele in the back with his cousin Dale Godinet.

"He used to say, 'Buddee, this is the best-kept secret in Oceanside,'" says Godinet. "It was his refuge."

Seau, who called everybody "Buddee" and also spelled it that way in texts, had two primary missions outside of football: aiding the youths of San Diego through his Junior Seau Foundation, launched in 1992, and making sure people young and old could exercise. So Junior and his cousin, Randall, who ran the Boys & Girls Club, opened Seau Fitness Center gym in 1996 with foundation money and a community grant, and filled it with the equipment that had been at the home he shared with his wife, Gina, until their divorce, as well as other machines donated personally by Arnold Schwarzenegger. They both served on the President's Council on Fitness, Sports & Nutrition.

Initially, the center opened as an after-school safe haven for teens, to keep them away from gangs, which are prevalent in Oceanside, just like in so many big cities in Southern California. When Junior realized the gym was mostly vacant while school was in session, Godinet and Junior reached out to the Senior Center nearby. And when the Boys & Girls club pulled its support, wanting to build up its own youth-only programs, the gym started catering to seniors. Its doors are open now largely because of city grants. Memberships are \$55 a year for patrons over 55, in honor of Junior's jersey number. While it is formally known as the Junior Seau Fitness Center, locals have nicknamed it Club 55.

But the gym is in jeopardy of closing. The outdated equipment needs maintenance. The building needs repairs. A window is broken. There are no funds for renovations because the Seau family's patriarch is gone.

Nearly a year after Junior Seau committed suicide on May 2, 2012, Outside the Lines conducted dozens of interviews with his family and friends, including a two-hour exclusive with Auwae, who got to know Seau in early 2010, instantly bonding with the fellow Polynesian and becoming a frequent workout partner. In hindsight,

JA5378

they say that Junior's actions signaled a man who was spiraling out of control, a man who wasn't prepared to leave behind the regimented life of pro football, the sport he'd been playing since he was a kid and slept with his three brothers in the Seaus' one-car garage.

The ebullient, smart, funny Junior was doing his best to hide a financial free fall and deep depression. But hidden from everyone, including him, was the degenerative brain disease chronic traumatic encephalopathy, which doctors confirmed this past January.

"Everyone's looking for answers," says Auwae, a Master Gunnery Sergeant stationed near Oceanside, whose intense friendship with Seau and grief over his death has left a life in disarray. "What could I have done better? I'm a Marine. I'm trained to look for these signs. I couldn't even help Junior because he was beyond our help."

So every morning the Seaus come to the fitness center, where photos of Junior and news clippings of his career on the wall make it a living, breathing memorial to their son. They feel closer to him here sometimes than even at his own gravesite; it is a building with a cause he cared so much about and people who continue to keep it thriving. They say they pray every day that the doors will stay open somehow.

"When I come here, people see me and they see my son," says Junior's father, Tiaina.

But, sadly, there is no certainty to the gym's financial future. Or the future Seau left behind for his friends and family.

JUNIOR SEAU QUIETLY opened the door to the massive luxury hotel suite on the Las Vegas Strip. He walked in slowly, face ashen, his massive body hunched over as if he were grimacing in physical pain.

"He slammed a glass on the bar and looked at me and said: 'Buddee,'" recalls Auwae, who was staying in the suite with him. "I go, 'Man, please don't tell me this.'"

According to Auwae, it was mid-December 2010 and Seau had just lost close to a million dollars in 90 minutes playing high-stakes blackjack -- \$40,000 to \$50,000 a hand. Earlier in the day, the 12-time former Pro Bowl linebacker told Auwae he had won close to \$800,000. After dinner at a local Italian restaurant, they went back to the room, where Auwae says he begged Seau to stay away from the blackjack tables.

"I said, 'Man, you clipped them,'" Auwae recalls. "'You did it. You got their money, just let it be. You can pay some bills, get some people off your back, and just relax. Let's go watch a show.'"

In the 10 months since they'd met at a reggae concert in San Diego, Auwae and Seau had traveled to Vegas a handful of times and had visited various California casinos, where Auwae says he witnessed Seau win big and lose big. This particular trip to Vegas was unplanned, coming just two days before Seau was due to attend his son Tyler's Division II semifinal football game for Delta State in Cleveland, Miss. At his home in Oceanside with Auwae, Seau suddenly called for a private jet.



The Junior Seau Fitness Center, known in Oceanside as "Club 55," is in danger of closing.

"One minute, we were sitting at the table, and then he said, 'Let's pop,'" says Auwae. "What do you mean? Where we going? Boom, next thing you know we're sitting in Las Vegas in a suite." A \$40,000-a-night suite with a private indoor pool, golf simulator, full butler service and a shellfish bar, which was stocked with crab and shrimp upon their arrival. Auwae says he never saw Seau put down any money, assuming the casino combed the room for a high roller like Junior.

According to a lengthy October 2012 report by [U-T San Diego](#), Seau owed \$1.3 million in casino markers to Bellagio and Caesars Palace in November 2010, just a month before his trip with Auwae. According to the same report, he was losing \$60,000 to \$70,000 a month because of a poor post-retirement investment in Ruby Tuesday restaurant franchises, while his own restaurant, Seau's, was also in need of upgrades he couldn't afford.

After Seau returned to the room announcing he had won \$800,000, Auwae recalls telling his friend to "just chill." Junior seemed to agree, content to lounge in the pool for a while with a cocktail in hand. Then there was a knock at the door. "They sent people up to the room to get him to go and play more," Auwae says, not wanting to name names or the casino. "So he goes down, and not even an hour and a half later he was back."

Junior looked distraught and told Auwae that he'd lost it all and then some. "He goes into his room and he's looking at the ceiling," Auwae says. "He's just staring like something's wrong with his head. At the time I'm like, dude, this guy's crazy. What's wrong with him? Why would he do that?"

In the past, Auwae had watched Junior in the high-stakes room and joined in the drinking and revelry that came along with it. But Seau had confided in him that his massive debts were mounting, and this trip was the first time Auwae truly understood that Junior was gambling away millions that didn't exist. And he couldn't watch anymore.

Auwae says Junior had already called Bette Hoffman, the trustee of Seau's estate, to wire more money to the casino. But Hoffman called Auwae, he says, and told him: "Whatever you got to do, you got to help [Junior]. You've got to stop him. You've got to stop him."

Auwae went to Junior's room, where he found him laying on the bed, still staring at the ceiling. "I go, 'Buddee, please let's go home. This ain't our world,'" Auwae says. "[Junior] goes, 'We gotta make it back. Buddee, I've got this.' And I go, 'Trust me, you don't got this.' He goes to bed. Morning comes, the money comes and the gentlemen come back up to grab him. He goes back down." According to Auwae, Seau lost another \$400,000 that day.

Instead of continuing on with Junior to Tyler's football game, Auwae says he returned to California. Despite the disagreement, the two men remained close and did occasionally go to the casinos again. Auwae says he often made attempts to dissuade Seau from playing such high stakes, but Junior ignored the advice, telling Auwae: "I'm a grown man."



Jay Michael Auwae (middle) still struggles with the loss of his "Buddee", and how the friendship triggered his own descent.

ON THE
FIELD,

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Junior was larger than life. Former teammates say he surely had multiple concussions, based on the way he hit and was hit. But they say he never admitted to being hurt or impaired when he was between the lines. It was that way outside them as well. The

man who played with no fear was afraid of showing weakness, especially in his private life.



Marine Jay Michael Auwae, a close friend of Seau's since 2010, is coming forward about Junior's spiral so people can better understand the crippling effects of CTE.

Yet friends and family say that looking back at his actions -- not just gambling but womanizing and partying and sleepless nights -- Junior was exhibiting symptoms of both depression and CTE, a progressive degenerative disease associated with multiple concussions and other forms of head injury. At the time, they were noticed only in pieces, never being linked together. No one completed the puzzle -- until it was too late.

Unlike most of Seau's closest friends, Auwae never knew Junior the pro football star. While he had recognized Seau surfing several times in Oceanside, the two didn't grow close until February 2010, a month after Seau retired from the NFL for good. They were at a reggae concert that Auwae was promoting with a friend in San Diego, and he got Junior backstage. By many accounts from numerous people in Oceanside, including Junior's parents, the two men became nearly inseparable after that.

"I think he liked my discipline from being a Marine," says Auwae. "He would tell people: 'Twenty-four years of service in the Marine Corps.' He was proud. Of course, I'm proud of him. And I'm Polynesian, too. We connected on a lot of levels."

At 6-foot-3, 255 pounds, Junior towered over the 5-6, 175-pound Auwae, who was raised in Hawaii and resembles Seau. Junior's sister called him "mini-me." Junior called him "Tattoo" after the character on the old TV show "Fantasy Island." But despite his stature, Auwae was almost as strong as Junior and their daily workouts became legendary competitions among the locals.

Just about every morning before Auwae went to his shift on base, they went through their routine: a run along the Strand, a trip to the Mission Avenue gym where Junior would secretly add weight to Auwae's bar, making sure to win the circuit workout. If the waves were right, then they'd head out with longboards. If they weren't, then it was to Swami's Cafe for breakfast or to Jitters, a coffee joint, where they'd strum ukuleles with "Pops," the owner, and cousin Dale.

"Being Polynesian, and being that we loved to surf, loved to play music -- we both couldn't sing -- loved to play ukulele, it was a way of healing, spiritual healing," says Auwae.

JA5381

Seau's charm drew countless new friends into his circle after retirement, each one feeling as though he or she had known Junior forever. Auwae knew he was referred to by some of Seau's friends as a hanger-on, but in reality, he says, he wanted nothing more than to be Seau's buddy. "[Junior] was just someone you couldn't not want to be around," he says.

That was also the case with the many women Seau had relationships with after divorcing his wife in 2002. One of his more serious girlfriends was Mary Nolan, whom he met in 2007 when she was only 22. Nolan lived with Seau in Boston during his final season as a New England Patriot in 2009, and returned with him to Oceanside, where they resided in Junior's \$3.2 million home. According to Auwae and others, it was Nolan who was by Junior's side most often during his ups and downs in Vegas.

But less than two months before Seau's impulsive gambling trip with Auwae, that relationship came to a traumatic end and may have been the first major clue that Seau's mental state was deteriorating.

Early on the morning of Oct. 18, 2010, he was arrested and taken to jail, accused of assaulting Nolan, who'd learned that Seau had been cheating on her. Seau claimed that he never put a hand on Nolan, who immediately left Oceanside without filing a complaint. After posting bail, Junior ran his car off a cliff in what many of his friends now are convinced was a first suicide attempt, though Seau always insisted he simply fell asleep at the wheel and the police agreed.

His ex-wife Gina and their three children, Sydney, Jake and Hunter, and Junior's oldest son, Tyler, picked Seau up from the hospital and brought him to their house for a few days to heal. When he had trouble sleeping and Gina didn't have Ambien, Junior called Auwae, who says he came to pick up his friend and drive him home.

The media attention surrounding the arrest and crash was enormous, and Auwae, who had left Hawaii after hearing the news, says he stayed with Junior inside his home for several weeks, ordering in food and watching football. Seau, bandaged and bruised, refused to discuss the cause or reason for the crash, yet Auwae didn't push. He was accustomed to comforting injured servicemen through his work with Wounded Warriors.

Players around the NFL confirm that Junior was a heavy drinker, but Auwae says it was about that time Seau's drinking worsened and he was taking Ambien along with it to sleep. Auwae was as well. His own marriage was struggling and he, too, was in a raw emotional state.

Initially, Auwae says, he was swept up in what appeared to be Seau's zeal for life, the jetsetting, the drinking, the gambling and the women. But running with Seau put a growing strain on Auwae's relationship with his wife and their three children. By September 2011, he even contemplated suicide; Junior convinced him otherwise. "He knew that I wanted to end it for myself, but he saved me," Auwae says.

If Seau had suicidal thoughts, he never expressed them. Meanwhile, Auwae and others say that they noticed his memory beginning to fade, unable to remember simple things, like his daughter Sydney's volleyball game, or plans for lunch, to even the most mundane things like the day of the week.



Following an arrest for a domestic dispute, Seau ran his SUV off of a cliff early on the morning of Oct. 18, 2010. Friends and family say it may have been his first attempt at suicide.

"He would be like, 'Buddee, I've got to go somewhere,'" Auwae recalls. "And Sydney would call: 'Dad, where you at?' He would be like, 'Oh, dang, we forgot the game.' As I look back, there were so many incidents. It was almost common for me to see that. But I'm not thinking that way. Nobody's thinking that way."

SEAU WAS ALSO suffering with being away from football, the regimented lifestyle he'd known for the last 20-plus years. Post-retirement therapy is often advised for professional athletes to cope with the loss of such an intense and integral part of their lives. But Seau never reached out for help, just like he always chose to play through pain.

Following retirement, he hosted a reality sports series on Versus that was canceled after just one season, and he failed to secure an NFL broadcasting job even at the regional level. Instead, he watched his former peers on TV, still part of the game he gravely missed.

The failing restaurants had depleted his savings, as had a costly divorce from Gina, child support payments (as high as \$40,000 a month during his playing days) and an extravagant lifestyle that at least back in 2006 had cost him around \$400,000 a year, according to the U-T San Diego report. In 2011, Seau took a \$1.2 million loan against the value of his Oceanside home.

Hoffman, a 73-year-old professional fundraiser and the trustee of Seau's estate, discussed Seau in an Outside the Lines interview for a different story. She said that Junior always believed he had to take care of the people around him. His family was massive and continually would go to his restaurant, Seau's, expecting to eat and drink for free. They had seen Junior make more than \$50 million during his playing career, and surely couldn't have imagined that most of it was gone.

"There were a lot of people who hung out with him that never paid for anything," she said. "I got all the bills. I would notice some of the expenses from restaurants and I'd say, 'Oh my God, Junior. How could you have spent this much money?' One thousand dollars, easily, for a night out."

Auwae also says he watched Junior spending more and more money on dinner and drinks -- which was typical for Seau, who always wanted to be in charge -- but paying with different credit cards.

Yet even a week and a half before Seau died, there was nothing to indicate, according to Auwae and other friends, that Junior was thinking about ending his life. Auwae and Junior had driven to a charity golf tournament in Fontana, Calif., run by former Kansas City Chiefs running back Christian Okoye.

"We came home and he goes, 'Buddee, next year just promise me when we go to the tournament we'll catch a private plane,'" Auwae says. "He'd ordered the Mayweather-Cotto fight at his restaurant for the following week. He had a trip to Hawaii tentatively scheduled with his kids. Mother's Day was coming up."

Junior's daughter, Sydney, had just been admitted to USC, his alma mater, where Seau had recently played his ukulele at the spring game. He also had recently become a grandfather, when his then-22-year-old son Tyler and Tyler's girlfriend had a daughter.

Former teammate Mark Walczak was coming to stay the last weekend of April 2012 with Junior to celebrate Walczak's 50th birthday. The two men had been roommates when Junior moved to San Diego for his

JA5383

rookie year in 1990.

Walczak told Outside the Lines that Junior seemed in good spirits at the thought of a weekend with old friends, and they spent Friday night, April 27, 2012, with Chargers team doctor David Chao and a few friends in Del Mar, about 20 miles from Oceanside. When they returned to Junior's house, there was an electrical outage in the neighborhood. They lit candles and talked long into the night.

Auwae joined Junior and Walczak and they spent much of the next day on Seau's porch overlooking the ocean, playing music and grilling barbecue. It was then that Auwae said he found an envelope with a letter inside by the kitchen sink that had "Do not read" written on it.

"Well, I'm sorry but I'm going to read it," Auwae remembers thinking. "Junior comes walking in, and we stare at each other for a few seconds. Then he grabs the paper and says, 'Have a seat.' He tells me, 'Buddee, listen to this song.'"

Inside the envelope was a letter with the lyrics to "Who I Ain't," co-written by his friend Jamie Paulin, a musician in Nashville, Tenn. Junior had learned it on the ukulele. The country song is about a man attempting to reconcile his sinning ways and his faith. Auwae thinks now that the letter might have been an attempt at a suicide note, but at the time thought nothing of it.

By then, Auwae says he was fully aware that Seau's financial issues were far worse than they'd been on that December 2010 night in Vegas. Junior would likely have to close the doors on his restaurant, Seau's, because he couldn't pay for the necessary upgrades or the lease. And that meant laying off hundreds of employees, including his own son Tyler, who worked there. During Walzack's birthday visit, according to U-T San Diego, the Bellagio attempted to claim a \$400,000 marker given to Seau, but the gambling debt couldn't be paid because of insufficient funds.

That Saturday night after the barbecue, Junior, Walczak and Auwae made plans go to a pricey restaurant, 333 Pacific, to have drinks. "He looks at me, 'Buddee, I need you to catch me.' Catch the bill," says Auwae, who was surprised that Seau would ask him to pay at such an expensive restaurant. "Normally I would treat if we were going to a cheaper establishment. But I was like, 'Oh, Buddee, cool. I'm going to pay it.'"

On Sunday, Walczak says he and Junior went to Carlsbad for lunch, where he was introduced to Seau's on-and-off girlfriend, Megan Noderer, who Junior had met at a wedding in Key West, Fla., a few months earlier. The pretty redhead was living in Dallas but came to San Diego to attend a baby shower for her sister-in-law. Later that night, Noderer and Walczak were waiting on Junior to return from meeting other friends for a birthday drink at a nearby bar. Walczak wanted to say goodbye to Junior before driving back to Phoenix. But by 10 p.m., Seau was still out so Walczak sent him a text.

"Buddee, thank you for an awesome birthday! I'm heading back now. Love you brother. Thanks again Buddee!!"

He never heard back.



Seau, less than a month before his suicide, strumming the ukulele at the USC spring game.

On Monday, April 30, 2012, Junior played in former Raider Tim Brown's golf tournament in nearby Dana Point and was paired with former 49er Jerry Rice, who later told reporters that Seau seemed upbeat; he was also posing for photos and talking about his children and the upcoming NFL draft.

But sometime after 7:45 a.m. Wednesday morning, May 2, according to the coroner's report, Junior walked into a guest bedroom with a .357 magnum revolver, put it near his heart and pulled the trigger. Police say there was an impression of the barrel on his chest, meaning there was no hesitation mark, which signals fear, uncertainty or foul play. A half-bottle of water was found on the nightstand next to the bed. The gun was next to his right hand. Noderer, who had gone to work out, was the first person to find Seau.

Police traced the gun back to its original owner, who told them he traded it in at a gun shop in New York "a long time ago." They have not found out why or how Junior came to have it.

Auwae, who was on base, got the call from cousin Dale and rushed to Seau's home. Junior was already on a gurney in a body bag. Family members were standing around in the garage stunned and weeping hysterically. "I grabbed my phone and I sent a text to one of the people I'd met from Vegas numerous times," Auwae says. "I said, 'My friend is dead. Thank you very much.'"

The person Auwae sent the text to, he says, was one of the Vegas casino hosts who enticed Junior back to the blackjack tables during the December 2010 episode. Auwae has since apologized to the man, having learned more about CTE and how it leads to compulsive behavior. He says Junior's gambling debts in Las Vegas and in California have been "washed away." The Las Vegas casino host declined to comment, but Auwae says several casinos have assured him Seau's debts no longer exist. U-T San Diego also reported that his gambling debts have been forgiven.

"I think it came to a boiling point," Auwae says of Junior's death. "Junior thought, 'This is the best way to deal with it, because my head has been hurting my whole life.' I don't think he had control with what was going on in his brain. He had too many things planned. He had too many people that loved him."



Junior's mother, Luisa, in the driveway of her son's home on the morning of May 2, begging him to come back.

A YEAR
LATER,
Oceanside
isn't the same
without
Junior. A
portrait of
him, fashioned
out of letters,
was donated to
Jitters, the
coffee shop
that was often
filled with the

JA5385

sounds of Junior's ukulele. The words spell out his favorite phrase, "Work for today, plan for tomorrow, pray for the rest."

Another giant portrait of Junior smiling, sits on an easel in his parent's pristine Oceanside



Friends, family and fans are still devastated by Seau's demise. They all thought he was larger than life, on and off the field.

home. They planned a small, private ceremony, with T-shirts bearing one of Junior's favorite scriptures for the May 2 anniversary of his death, and then a backyard barbecue at their house, just like those Junior loved to throw impromptu and they loved to host.

"It's been hard to get to that point of everything not continuing to be very difficult," says Junior's sister, Annette. "Last year, when he died, the music stopped. But now the kids are starting to pick up their ukuleles again, remembering songs Junior taught them."

"There will be music Thursday," cousin Dale says. "Much music."

Auwae says he didn't go public with his knowledge of Junior's finances and gambling habits until now because he never wanted Seau's memory to be tarnished. But in light of the CTE diagnosis, Auwae says he believes it's important for others to understand the insidiousness of the disease and how it can ruin lives. Looking back, he recalls the two of them watching coverage of former NFL safety Dave Duerson's suicide. Duerson shot himself in the chest and left a suicide note, requesting that his brain be studied. Seau turned to Auwae and compared Duerson's emotional and physical struggles to those of the Wounded Warriors who Auwae continues to help.

"Now I feel like he knew what was going on," Auwae says.

At the same time, he also wrestles with how much Junior's suicide was just a way out for him, a solution to a myriad of problems that may or may not have been caused or blurred by CTE. All he really knows for certain, he says, is how 2½ years with Junior changed his own life.

"Buddee, ever since I met you my life went upside down," says Auwae, whose wife filed for divorce less than two weeks after Junior's death and last November filed a restraining order against him that will be lifted this week. (No charges were ever filed.) "A part of me regrets it, a part understands that everything has a purpose. There's this tug of war."

Auwae says he doesn't visit Junior's parents and siblings as much as he used to, saying it's too painful because they see Junior in him. Still, he will be there for the May 2 ceremony, ukulele in hand.

The status of the Junior Seau Foundation is believed to be stable because its funds are separate from Seau's estate, while the status of Seau's estate remains unknown. By law a person's estate should be revealed within a year of his or her death, but it is unclear what, if anything, there will be to split. Some assets have been sold. Junior's beachside home, which he bought in 2005 for \$3.2 million, recently went for \$1.975 million.

A family source told OTL that Pittsburgh Steelers safety Troy Polamalu, who grew up near Junior and went to USC and considers himself family, paid a good portion of Seau's funeral service and for his grave plot in the Eternal Hills Memorial Park, a prime spot near the main path where Junior's parents also will be buried. The family visits often, as does Auwae. One day in early spring, before the headstone was placed, he went and strummed "Earth Angel," one of Junior's favorite songs.

Seniors continue to trickle into the Junior Seau Center to rehabilitate injuries and exercise at a low cost, but Club 55 will shut its doors if it doesn't receive funds. The city of Oceanside recently donated \$7,500 for the center (along with the Senior Center next door), but it will need substantially more.

A giant "Say Ow" banner hangs on the wall behind the strength machines. It was the name of Seau's line of activewear that ended as yet another failed business venture. Seau's mother sits at one of the machines and breaks into tears at the thought that it's been a year since her son took his own life. She can't bear that the Junior Seau Fitness Center, which meant so much to Junior, could soon be gone.

"It's where he could come and be himself," says cousin Dale. "It was a refuge for him and is still a tribute to him. His soul lives within these walls."

EXHIBIT 13



ESPN.com: NFL

[\[Print without images\]](#)

Thursday, January 26, 2006

Ex-Steeler Long drank antifreeze to commit suicide

Associated Press

PITTSBURGH -- Former [Pittsburgh Steelers](#) lineman Terry Long committed suicide by drinking antifreeze, a revised death certificate shows, and did not die as a direct result of football-related head injuries.

The Allegheny County coroner ruled in September that Long, 45, who had attempted suicide before, had died of meningitis. The condition, a swelling of the lining of Long's brain, was caused by football-related "chronic traumatic encephalopathy," also known as "punch-drunk syndrome," said the coroner at the time, Dr. Cyril Wecht.

But a revised death certificate, which Wecht's office never publicly announced, was filed Oct. 19, listing the manner of Long's death as suicide from drinking antifreeze. The ruling was changed when outside laboratory tests on Long's tissue and urine showed they contained ethylene glycol, the active ingredient in antifreeze, county officials said.

Joseph Dominick, chief of operations at the medical examiner's office, said Thursday that the antifreeze was what caused the swelling of the brain and the brain lining, and the football-related brain injuries were a contributing factor to the death.

The finding was first reported by the Pittsburgh Post-Gazette on Thursday.

Long died in a hospital about five hours after he was found unresponsive in his suburban Pittsburgh home on June 7.

The original findings reinvigorated the debate over the dangers football players -- particularly linemen -- face from repetitive head injuries.

The medical examiner felt Long's history of brain injury was still a "significant factor" in the death and that he would be remiss in not mentioning it in the updated report, Dominick said.

"People with chronic encephalopathy suffer from depression," Dr. Bennet Omalu, a neurologist who worked on Long's autopsy and is still with the medical examiner's office, told the newspaper. "The major depressive disorder may manifest as suicide attempts. Terry Long committed suicide due to the chronic traumatic encephalopathy due to his long-term play."

But Steelers team physician Dr. Joseph Maroon, a neurosurgeon and nationally recognized expert on concussions, disagreed with Omalu.

"I think it's fallacious reasoning, and I don't think it's plausible at all," Maroon said. "To go back and say that he was depressed from playing in the NFL and that led to his death 14 years later, I think is purely speculative."

Long started at right guard for the Steelers from 1984 until 1991, when he attempted suicide with rat poison after he was suspended for violating the NFL's steroid policy. Long later rejoined the team

JA5389

although he was not re-signed after one season.

In March, Long was indicted by a federal grand jury on charges he fraudulently obtained loans for a chicken-processing plant which prosecutors allege he burned to the ground for the insurance money. At the time he died, Long's neighbor said he was separated from his second wife and was depressed about that as well as the federal charges he faced.

EXHIBIT 14



Military risk factors for Alzheimer's disease

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Abstract

Traumatic brain injury (TBI) and post-traumatic stress disorder (PTSD) are signature injuries of the wars in Iraq and Afghanistan and have been linked to an increased risk of Alzheimer's disease (AD) and other dementias. A meeting hosted by the Alzheimer's Association and the Veterans' Health Research Institute (NCIRE) in May 2012 brought together experts from the U.S. military and academic medical centers around the world to discuss current evidence and hypotheses regarding the pathophysiological mechanisms linking TBI, PTSD, and AD. Studies underway in civilian and military populations were highlighted, along with new research initiatives such as a study to extend the Alzheimer's Disease Neuroimaging Initiative (ADNI) to a population of veterans exposed to TBI and PTSD. Greater collaboration and data sharing among diverse research groups is needed to advance an understanding and appropriate interventions in this continuum of military injuries and neurodegenerative disease in the aging veteran.

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Keywords:

Alzheimer's disease; Risk factors; Military medicine; Traumatic brain injury; Posttraumatic stress disorder; Tau; Beta-amyloid; Apolipoprotein E e4; Biomarkers; Alzheimer's Disease Neuroimaging Initiative; Vietnam; Veterans; Chronic traumatic encephalopathy; Blast injury

1. Introduction

Mounting evidence suggests that traumatic brain injury (TBI) and post-traumatic stress disorder (PTSD) resulting from military exposures increase the risk of developing neuro-

degenerative diseases such as Alzheimer's disease (AD). Therefore, understanding the mechanisms underlying this association has become a high priority, not only for the Department of Defense (DoD) and the Department of Veterans Affairs (VA), but for the Alzheimer's research community as well, which has recently intensified its focus on identifying individuals at high risk and preventing disease in its presymptomatic stages. Recognizing their shared priorities,

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stakeholders and researchers from these communities came together on May 8, 2012, at a meeting hosted by the Alzheimer's Association to strategize about research partnerships to move the field forward quickly. The meeting was co-sponsored by the Veterans' Health Research Institute (NCIRE).

This *Perspective* article summarizes information presented at this meeting, including population-level evidence that TBI and PTSD in early life (i.e. postnatally) increases the risk of developing AD later in life; current evidence and hypotheses regarding the pathophysiological mechanisms that may underlie and link TBI, PTSD, and AD; and research efforts that are needed or are underway to advance our understanding of these mechanisms. These research communities have not traditionally collaborated or considered related mechanisms and markers of disease.

2. Soldiers and civilians at risk for TBI, PTSD, and AD

Since the beginning of the Iraq War in March of 2003, more than 200,000 U.S. service members deployed to Iraq and Afghanistan as part of Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) have been diagnosed with TBI [1]. The vast majority of these cases were classified as mild TBI (mTBI), also known as concussion [2]. In the same period of time, nearly 67,000 deployed U.S. military personnel, as well as more than 16,000 nondeployed U.S. military personnel, were newly diagnosed with PTSD [3]. Approximately 22% of Iraq and Afghanistan veterans entering the VA health care system between 2002 and 2008 were diagnosed with PTSD [4]. TBI and PTSD have been called “invisible wounds,” yet they are also considered the “signature injuries” of these 21st century wars [5]. TBI and PTSD are distinct disorders with different causes, but they may occur together and share some symptoms such as deficits in attention and memory, irritability, and sleep disturbances.

Moreover, both of these conditions raise the risk of substantial and severe long-term sequelae, including dementia. A recent cohort study of more than 180,000 veterans from the VA's own National Patient Care Database found that those diagnosed with PTSD were more than twice as likely to develop dementia [6]. Also, a prospective study of World War II veterans found that moderate and severe, but not mild, head injury was associated with 2- to 4-fold increased risk of AD and other dementias in late life [7].

The association of TBI with dementia has also been documented in many studies involving nonveteran populations (reviewed in [8]). Dementia pugilistica was first recognized in professional boxers in 1928 [9]. This condition, now referred to as chronic traumatic encephalopathy (CTE), has now been identified not only in boxers, but also in American football and other contact sports as well [10], and it has been linked to subsequent development of dementia [11]. CTE is thought to result from repeated multiple head injuries or sub-clinical impact to the head [12]. CTE manifests initially with emotional and behavioral symptoms; cognitive changes, including memory loss and executive dysfunction, later be-

come apparent. With increasing age, individuals with CTE often develop overt dementia, gait problems, parkinsonism, and speech abnormalities. Approximately 12% also develop an amyotrophic lateral sclerosis (ALS)-like condition called chronic traumatic encephalomyopathy. The relationship of CTE to the development of AD pathology is unknown.

3. TBI

TBI is defined as an injury resulting from external force to the head, which results in an alteration or loss of consciousness. Most military or combat-related TBI occurs as a closed head injury as a result of exposure to an explosion (via primary blast wave, rotational brain injury, or brain contusion), motor vehicle accident, fall, or athletic activity. TBIs are classified as mild, moderate, or severe on the presence and duration of loss of consciousness (LOC), alteration of consciousness or mental state, and post-traumatic amnesia. The Glasgow Coma Scale (GCS) is the most common instrument used to assess the consequences of TBI. Other instruments include concussive scales such as the Cantu or Colorado scales.

The widespread use of improvised explosive devices (IEDs) in Iraq and Afghanistan has produced a high prevalence of TBI, reported to be as high as 23% of clinician-confirmed cases in one brigade combat team of nearly 4000 soldiers [13]. Although controversial, a unique TBI condition caused by a blast has been characterized by a different clinical pattern than TBI caused by other mechanisms [14–16], and the implications of these differences in terms of diagnosis, prognosis, and treatment are under investigation. The predominant neuropathological signs of TBI include diffuse axonal injury (DAI) and microhemorrhage [17]. Service members also frequently have a combination of injuries resulting from blast and nonblast (noncombat) events such as sports and motor vehicle accidents. Indeed, the vast majority (84%) of military TBIs occur in nondeployed settings from accidents, falls, sports, or training. Other factors that may influence the clinical and pathological presentation of TBI include the presence of polytrauma, PTSD, or other comorbidities as well as the frequency, severity, and cumulative effect of injuries. Genetic differences are also thought to play an important role.

To facilitate research on TBI across military, civilian, and veteran populations, a working group representing multiple federal agencies proposed a core set of outcome measures. This resulted in a set of common data elements (CDEs) that would enable comparison of findings across studies [18]. A 2-year multicenter study to test and refine these CDEs, the Transforming Research and Clinical Knowledge in Traumatic Brain Injury (TRACK-TBI) study, was funded by the National Institute of Neurological Disorders and Stroke (NINDS) in 2010. TRACK-TBI is also collecting data to support standardization of neuroimaging and genomics and proteomics tests for dementia. At the time of the meeting, TRACK-TBI had enrolled and collected imaging

or biospecimen data from more than 600 patients who presented to an emergency department within 24 hours of having a head injury. Most of these head injuries were mild; however, more than one quarter of individuals with mild TBI screened positive for PTSD, suggesting that the findings in this population may be applicable to military populations.

4. PTSD

In contrast to TBI, PTSD connotes a psychological condition in which an emotionally distressing event led to a constellation of symptoms. In patients with PTSD, there appear to be changes in synaptic connectivity associated with learning, such as fear conditioning, as well as alterations in central and peripheral hormones and regional atrophy of both gray and white matter. Veterans with PTSD have been shown to have reduced hippocampal volume that correlates with impaired memory, and functional imaging studies indicate that patients with PTSD have impaired brain function in the medial prefrontal cortex, amygdala, and hippocampus [19]. Brain atrophy in PTSD is also affected by PTSD severity [20,21]. However, chronic stress due to PTSD has also been shown to cause hypertrophy of the amygdala, an area of the brain that has evolved to deal with stressful, dangerous, and threatening situations. Thus, it may be that hippocampal atrophy represents an adaptive change in response to high stress rather than a form of brain damage.

Another possibility is that individuals with smaller hippocampi are at higher risk of developing PTSD. A study in Gulf War veterans [20] showed that current but not lifetime PTSD symptoms were associated with smaller hippocampal volume. This may mean that hippocampal size reverts to normal when PTSD symptoms abate or that individuals with small hippocampi fail to recover from PTSD. However, another study of identical twin pairs discordant for combat exposure in Vietnam found that hippocampal diminution was shared by the combat-unexposed twins of combat veterans with PTSD [22].

Studies also suggest that genetic factors and early life adversity may also influence the subsequent development of PTSD, possibly through neuroendocrine mechanisms involving glucocorticoid receptor responsiveness [23].

Given the different etiologies and symptoms, different diagnostic and treatment strategies are needed for subjects with PTSD compared with those with TBI; however, the overlap in symptoms causes problems with diagnosis. Moreover, any type of physical injury, including even mild TBI, increases the risk for PTSD [24–26], and PTSD can exacerbate cognitive and other symptoms of TBI [27]. However, PTSD can and usually does occur in the absence of TBI, and TBI is neither necessary nor sufficient for PTSD.

5. Identifying and managing TBI

Evaluating someone who has experienced head trauma to determine the extent of the injury is critical to limiting further brain damage. Rapid assessment is needed in the mili-

tary theater and on the playing field to determine if it is safe for the soldier or athlete to return to his or her unit or team. Indeed, studies in high school and college football players suggest that there may be a period of increased vulnerability to repeat concussion for 7–10 days after a concussion [28]. In the military theater, screening is complicated because TBI occurs in the context of sleep deprivation, nutritional changes, emotional stress, polytrauma, and difficult environmental factors. In addition, service members may hide symptoms so they can return to action quickly. However, imaging studies show that there may be substantial brain injury even in the absence of self-reported symptoms [29].

In 2007, the DoD adopted a common diagnostic criterion set for TBI reporting to include any period of loss or a decreased level of consciousness, loss of memory for events immediately before or after the injury, or alteration in mental state at the time of the injury (confusion, disorientation, slowed thinking, etc.) [30]. The Military Acute Concussion Evaluation (MACE) was developed in 2006 by the Defense and Veterans Brain Injury Center (DVBIC) to assess in-theater combat-related TBI [31]. The MACE is used in conjunction with clinical algorithms, both of which were further modified in 2012 to incorporate standards for in-theater concussion care centers. These standards were based on recommendations from the Gray Team, a multiservice team formed by the Chairman of the Joint Chiefs of Staff.

Despite these efforts to improve the identification of TBI in theater, studies suggest that many cases of mild TBI are missed [24]. This indicates the need to come up with better early detection procedures in theater that rely on objective measures and mandatory reporting. New operational rules that are more event driven than symptom driven represent a paradigm change for the military. These rules require a 24-hour rest period after an incident, with prolonged rest in cases of multiple concussions over 12 months. Specific recommendations are provided for issues such as sleep problems and headache. Injured personnel must refrain from sports or other activities that increase the risk of concussion until medically cleared. MACE documentation is required after the event and as part of the return-to-duty evaluation. If symptoms do not improve, service members are moved to a concussion center. Medical screening is also required for all persons in any damaged vehicle, anyone within 50 m of blast, or anyone who receives a direct blow to the head.

6. Links between TBI, PTSD, and AD: Mechanisms, biomarkers, and neuroimaging

There are several possible mechanisms that could link PTSD and TBI with late-life dementia. Identification of common underlying biological mechanisms is essential to an improved understanding of military risk factors for the development AD and for the design of effective prevention and treatment strategies.

Brain injury may cause earlier onset or acceleration of Alzheimer's pathology [32]. For many years, β -amyloid

(A β) has been considered the dominant driver of AD. Scientists have also been investigating other molecular and cellular pathways and processes that contribute to AD pathogenesis. Abnormal phosphorylation of tau, which forms the neurofibrillary tangles characteristic of the AD brain, has been implicated as a mechanism of AD pathology for decades [33]. In the early stages of CTE, massive deposition of phosphorylated tau (phospho-tau) is seen, particularly in the frontal cortex [11], and this tauopathy is distinct from that seen in AD. The connection between phospho-tau deposition in CTE and AD pathology is unknown. One possibility is that the tauopathy induced by brain injury may predispose an individual to later development of AD. Further, in neuropathological studies of blast-exposed veterans, changes were seen that were similar to those in young athletes with CTE [34].

A well-established risk factor for development of AD is the presence of an apolipoprotein E $\epsilon 4$ (*APOE* $\epsilon 4$) allele [35], which encodes for a protein gene product that regulates A β metabolism. The presence of the *APOE* $\epsilon 4$ allele is also associated with increased risk of poor outcome after TBI [36], suggesting a link between *APOE* $\epsilon 4$ and aberrant A β metabolism in the wake of head trauma. However, it is interesting to note that it is the *APOE* $\epsilon 2$ rather than the *APOE* $\epsilon 4$ allele that appears to be associated with impaired memory and worsening PTSD symptoms in combat-exposed veterans [37].

Another possible mechanism involves an association of PTSD and TBI with reduced cognitive reserve (CR). The concept of CR posits that intelligence, education, or other life experiences are in some way protective against neurodegeneration [38]. CR may influence the likelihood of developing PTSD [39], and in a study of children and adolescents with mild TBI, the occurrence of postconcussive symptoms was shown to be linked to CR [40]. It is possible that TBI earlier in life damages neurons, reduces connections between neurons, or otherwise diminishes the brain's capacity to function. Thus, later in life when Alzheimer's pathology may develop, an individual who had experienced TBI may develop symptoms at an earlier stage of pathology than someone who had not been exposed to TBI. Thus, TBI could be a risk factor for AD by both mechanisms: acceleration of Alzheimer's pathology and reduction of CR.

Biomarkers should be helpful in clarifying these mechanisms, in identifying endophenotypes of disease, and in assessing soldiers after a blast exposure to determine if intervention or removal from theater is needed. Using boxing as a human model of TBI, Zetterberg and colleagues studied biomarker changes in the cerebrospinal fluid (CSF) of amateur boxers [41] and later in Olympic boxers [42]. They showed that two markers of neuronal and axonal injury—neurofilament light (NFL) protein and total tau—as well as the astroglial injury marker glial fibrillary acidic protein (GFAP) were increased in boxers after bouts in which they had received many hits, but that only NFL and GFAP remained elevated after a period of rest, suggesting that boxing is clearly associated with profound signs of subcortical axonal injury.

Tau, the protein most often linked to neuronal damage in AD, did not remain elevated in these subjects, suggesting a different pathological mechanism in CTE compared with AD. The finding of increased NFL protein would be consistent with reduction of CR. The same team of investigators also assessed CSF biomarkers in army officers who had been exposed to blast overpressure from repeated explosions of firing heavy weapons and found no evidence of brain damage [43].

Neuroimaging of military personnel who have experienced TBI has also provided important clues about the mechanisms of injury and the possible relation to subsequent development of dementia, although many questions still remain. Diffusion tensor imaging (DTI) is particularly useful in identifying DAI, and studies using DTI support the hypothesis that blast-related TBIs may involve axonal injury [44].

7. ADNI and DoD-ADNI

The Alzheimer's Disease Neuroimaging Initiative (ADNI) is an ongoing, longitudinal, multicenter study supported by the National Institutes of Health (NIH) and private industry sponsors. Launched in 2003, ADNI is a public-private partnership among federal agencies (NIH, U.S. Food and Drug Administration), pharmaceutical companies, and nonprofit philanthropic organizations, including the Alzheimer's Association. The primary goal of ADNI is to develop, validate, and standardize the use of neuroimaging as an AD biomarker for use in clinical trials. Data generated by ADNI is made available on a public database (UCLA/LONI/ADNI). This database includes clinical data and the imaging data archive from where investigators may upload MRI and PET scans. The ADNI/LONI database is available to all qualified scientists and has supported the publication of more than 300 papers [45].

The first phase of ADNI, now known as ADNI-1, was completed in October 2010. More than 800 participants were enrolled at 57 sites in the United States and Canada. Data were collected from clinical exams, cognitive tests, structural magnetic resonance imaging (MRI), and blood tests. In addition, approximately half of the subjects also had fluorodeoxyglucose (FDG) positron emission tomography (PET) scans and lumbar punctures (LP) for CSF biomarker testing. As a result of add-on funding from the Alzheimer's Association and General Electric, approximately 100 participants had amyloid imaging PET scans with Pittsburgh compound B (PiB). ADNI-1 enrolled three groups of subjects: those with MCI, those with mild AD, and a control group who were cognitively normal. Subsequently, a Grand Opportunities (GO) grant and a continuation grant (ADNI-2) enabled the enrollment of an additional cohort of early MCI (eMCI) participants because it had become clear that the MCI population enrolled in the original ADNI cohort were too far advanced to capture changes that reflect the early stages of AD. In addition to exploring a broader range of severity, ADNI-2 is using an expanded set of imaging tools, including DTI, arterial spin labeling (ASL)

perfusion imaging, resting blood oxygen-level dependent (BOLD) MRI, and analysis of hippocampal subfields.

The major accomplishment of ADNI thus far has been to show that brain atrophy, especially in the hippocampus, is the most sensitive and robust measure of change that can be detected in AD and that it correlates with neuropsychological and functional changes. Another major finding from ADNI has been to show that amyloid deposition as measured by PET imaging predicts a high rate of conversion to MCI and AD [46]. CSF amyloid correlates with amyloid imaging, and acquisition of CSF allows the measurement of other biomarkers. A hypothetical model of biomarker changes as AD progresses was proposed in 2010 [47]. This model predicts lower CSF levels of β -amyloid 42 (A β 42) as an early sign of AD, followed by elevation of tau and phospho-tau, which signal neuronal injury, and these biomarker changes have been linked to cognitive changes in healthy older adults [48]. Recent ADNI data show that approximately 20% of patients with clinically diagnosed AD appear not to have high levels of brain amyloid detected by amyloid PET imaging. Furthermore, using amyloid PET imaging, approximately 60% of subjects with MCI are positive (indicating MCI due to AD) and 30% of normal subjects in their middle 70s are positive (suggesting preclinical AD). ADNI has been a model for widespread sharing of scientific data without embargo. The World Wide ADNI project (sponsored by the Alzheimer's Association) links U.S. ADNI to similar projects in Australia, Japan, Europe, China, Taiwan, Argentina, Brazil, and Korea [49].

The Vietnam Veterans ADNI Project (DoD-ADNI) is the newest addition to ADNI. This project, funded by DoD, will enroll 210 Vietnam war veterans between the ages of 60 and 80 to examine the effects of TBI and PTSD on AD using imaging and biomarkers.

The primary hypothesis to be tested in DoD-ADNI is that veterans with combat-associated TBI and/or PTSD have increased risk for AD compared with veteran controls as measured by (1) increased florbetapir uptake on amyloid PET scans; (2) decreased CSF A β ; (3) increased CSF tau and phospho-tau; (4) increased atrophy in several regions in the brain; and (5) reduced cognitive function, particularly delayed recall. The study will also examine the role of brain reserve and *APOE* genotype as well as the correlation between severity of TBI and severity of PTSD or cognitive impairment. The ultimate goal, as in the broader ADNI study, is to enable clinical trials and provide data to other investigators studying AD and TBI.

Subjects in DoD-ADNI will undergo a battery of imaging tests, structural (T1-weighted, T2-weighted, fluid attenuated inversion recovery [FLAIR] MRI, and DTI) and functional (ASL, functional MRI [fMRI], FDG-PET), as well as amyloid imaging with florbetapir. One of the advantages of DoD ADNI is that baseline data are available because of the armed forces qualifying exam and other examinations given at the time of induction. These assessments will enable investigators to determine how many of the veterans fulfill biomarker and imaging criteria for AD or other dementias,

such as frontotemporal dementia (FTD) or vascular dementia, and whether dementia-related biomarker or imaging patterns correlate with a history of CTE or PTSD.

The VA has launched two other efforts aimed at improving outcomes for veterans with TBI and PTSD through its three War-Related Illness and Injury Centers (WRIISCs). The Markers for the Identification, Norming, & Differentiation of TBI and PTSD (MIND) study is designed to evaluate the prevalence of TBI and PTSD in OEF/OIF veterans and the effectiveness of screening instruments as well as to identify sensitive and specific objective markers for TBI and PTSD and develop prediction models. The MIND study includes multiple assessments: neuroimaging (DTI, PET, and fMRI); endocrine, neurologic, sensorimotor, and immunologic function; and angiogenic, genomic, and cognitive metrics. A second study, the Blast Injury Outcomes (BIO) study, aims to characterize mild and moderate TBI and PTSD resulting from blast injuries and to examine the relationship between these disorders using multiple measures, eventually leading to a diagnostic prediction algorithm. A convenience sample will be enrolled from multiple sites, including VA medical centers, college campuses, and community-based outpatient clinics. Subjects will be evaluated using neuroimaging; a full cognitive battery; and neurobehavioral, psychosocial, and physiologic measures. The VA and DoD recently released two Requests for Applications for grants concerning TBI and PTSD. Millions of dollars will be awarded to the successful applicants.

8. Moving forward

DoD-ADNI provides a unique opportunity to plot the development of biomarkers and correlate them with different types of head injury and PTSD; however, this is only a first step toward fully understanding the relationship of PTSD and TBI to AD. Realization of this goal will require a larger study to collect more subjects, including those with MCI and longitudinal measurements beyond 2 years. Additional studies should be funded to enroll younger subjects to capture early signs of pathology and map the progression to AD. There was broad agreement among participants at the Military Risk Factors for Alzheimer's Disease meeting that coordinated research and data sharing are required to discover relationships among AD, TBI, PTSD, and other military risk factors and to develop effective prevention and treatment strategies.

Additional priorities identified include

- Discovery and validation of additional biomarkers, including markers of inflammation and synaptic dysfunction, as well as other markers that may better predict neurodegeneration after TBI and PTSD.
- Determination of thresholds for exposure to injury in terms of number, timing, and the cumulative effects of exposure as well for TBI and PTSD.
- Development of a validated measure to capture TBI exposure since the point of first injury.

- Continued research on and development of TBI models for basic research.
- Development of standardized assays for biomarkers that will support longitudinal assessments for individuals with injuries. This includes new tests for alterations in olfactory memory and changes in cognition. Development of new radioligands for neuroimaging is also essential.
- Integration of results from standardized assays with electronic medical records or other databases.
- An improved understanding of the frequency of comorbidity of CTE with DAI and/or microhemorrhage.
- Development of tau ligands for imaging tau deposition in the intact brain.
- Support of longitudinal, well-defined studies that focus on the “highest risk” individuals for neurodegenerative disease.
- Creation and dissemination of a study inventory. The inventory would contain new initiatives and those currently funded. This would promote collaboration, avoid unnecessary duplication of efforts, and identify cohorts for longer term evaluation for late-stage disease.

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References

- [1] DoD worldwide numbers for TBI. Accessed September 9, 2012 at: <http://www.dvbioc.org/dod-worldwide-numbers-tbi>.
- [2] Barth J, Isler W, Helmick K, Wingler I, Jaffee M. Acute battlefield assessment of concussion/mild TBI and return to duty evaluations. In: Kennedy C, Moore J, eds. *Military neuropsychology*. New York: Springer; 2010. p. 127–74.
- [3] Fischer H. U.S. military casualty statistics: Operation New Dawn, Operation Iraqi Freedom, and Operation Enduring Freedom. Washington, DC: Congressional Research Service; 2010.
- [4] Seal KH, Metzler TJ, Gima KS, Bertenthal D, Maguen S, Marmar CR. Trends and risk factors for mental health diagnoses among Iraq and Afghanistan veterans using Department of Veterans Affairs health care, 2002–2008. *Am J Public Health* 2009;99:1651–8.
- [5] Invisible wounds: serving service members and veterans with PTSD and TBI Washington, DC: National Council of Disability; 2009.
- [6] Yaffe K, Vittinghoff E, Lindquist K, Barnes D, Covinsky KE, Neylan T, et al. Posttraumatic stress disorder and risk of dementia among US veterans. *Arch Gen Psychiatry* 2010;67:608–13.
- [7] Plassman BL, Havlik RJ, Steffens DC, Helms MJ, Newman TN, Drosdick D, et al. Documented head injury in early adulthood and risk of Alzheimer's disease and other dementias. *Neurology* 2000; 55:1158–66.
- [8] Shively S, Scher AI, Perl DP, Diaz-Arrastia R. Dementia resulting from traumatic brain injury: What is the pathology? *Arch Neurol* 2012;69:1–7.
- [9] Martland H. Dementia pugilistica. *JAMA* 1928;91:103–7.
- [10] McKee AC, Stein TD, Nowinski CJ, Stern RA, Daneshvar DH, Alvarez VE, et al. The Spectrum of Disease in Chronic Traumatic Encephalopathy. *Brain* 2013;136:43–64.
- [11] McKee AC, Cantu RC, Nowinski CJ, Hedley-Whyte ET, Gavett BE, Budson AE, et al. Chronic traumatic encephalopathy in athletes: progressive tauopathy after repetitive head injury. *J Neuropathol Exp Neurol* 2009;68:709–35.
- [12] Gavett BE, Stern RA, McKee AC. Chronic traumatic encephalopathy: a potential late effect of sport-related concussive and subconcussive head trauma. *Clin Sports Med* 2011;30:179–88. xi.
- [13] Terrio H, Brenner LA, Ivins BJ, Cho JM, Helmick K, Schwab K, et al. Traumatic brain injury screening: preliminary findings in a US Army Brigade Combat Team. *J Head Trauma Rehabil* 2009;24:14–23.
- [14] Armonda RA, Bell RS, Vo AH, Ling G, DeGraba TJ, Crandall B, et al. Wartime traumatic cerebral vasospasm: recent review of combat casualties. *Neurosurgery* 2006;59:1215–25. discussion 1225.
- [15] Bell RS, Vo AH, Neal CJ, Tigno J, Roberts R, Mossop C, et al. Military traumatic brain and spinal column injury: a 5-year study of the impact blast and other military grade weaponry on the central nervous system. *J Trauma* 2009;66:S104–11.
- [16] Maas AI, Menon DK. Traumatic brain injury: rethinking ideas and approaches. *Lancet Neurol* 2012;11:12–3.
- [17] Kumar R, Husain M, Gupta RK, Hasan KM, Haris M, Agarwal AK, et al. Serial changes in the white matter diffusion tensor imaging metrics in moderate traumatic brain injury and correlation with neurocognitive function. *J Neurotrauma* 2009;26:481–95.
- [18] Thurmond VA, Hicks R, Gleason T, Miller AC, Szuffita N, Orman J, et al. Advancing integrated research in psychological health and traumatic brain injury: common data elements. *Arch Phys Med Rehabil* 2010;91:1633–6.
- [19] Bremner JD. Neuroimaging in posttraumatic stress disorder and other stress-related disorders. *Neuroimaging Clin N Am* 2007;17:523–38. ix.
- [20] Apfel BA, Ross J, Hlavin J, Meyerhoff DJ, Metzler TJ, Marmar CR, et al. Hippocampal volume differences in Gulf War veterans with current versus lifetime posttraumatic stress disorder symptoms. *Biol Psychiatry* 2011;69:541–8.
- [21] Cardenas VA, Samuelson K, Lenoci M, Studholme C, Neylan TC, Marmar CR, et al. Changes in brain anatomy during the course of post-traumatic stress disorder. *Psychiatry Res* 2011;193:93–100.
- [22] Gilbertson MW, McFarlane AC, Weathers FW, Keane TM, Yehuda R, Shalev AY, et al. Is trauma a causal agent of psychopathologic symptoms in posttraumatic stress disorder? Findings from identical twins discordant for combat exposure. *J Clin Psychiatry* 2010;71:1324–30.
- [23] Yehuda R, Flory JD, Pratchett LC, Buxbaum J, Ising M, Holsboer F. Putative biological mechanisms for the association between early life adversity and the subsequent development of PTSD. *Psychopharmacology (Berl)* 2010;212:405–17.
- [24] Elder GA, Cristian A. Blast-related mild traumatic brain injury: mechanisms of injury and impact on clinical care. *Mt Sinai J Med* 2009; 76:111–8.
- [25] Hoge CW, Castro CA, Messer SC, McGurk D, Cotting DI, Koffman RL. Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *N Engl J Med* 2004;351:13–22.
- [26] Kennedy JE, Leal FO, Lewis JD, Cullen MA, Amador RR. Posttraumatic stress symptoms in OIF/OEF service members with blast-related and non-blast-related mild TBI. *NeuroRehabilitation* 2010;26:223–31.
- [27] Bryant RA, Harvey AG. Postconcussive symptoms and posttraumatic stress disorder after mild traumatic brain injury. *J Nerv Ment Dis* 1999; 187:302–5.
- [28] McCrea M, Guskiewicz K, Randolph C, Barr WB, Hammeke TA, Marshall SW, et al. Effects of a symptom-free waiting period on clinical outcome and risk of reinjury after sport-related concussion. *Neurosurgery* 2009;65:876–82.
- [29] Bergsneider M, Hovda DA, Lee SM, Kelly DF, McArthur DL, Vespa PM, et al. Dissociation of cerebral glucose metabolism and level of consciousness during the period of metabolic depression following human traumatic brain injury. *J Neurotrauma* 2000;17:389–401.
- [30] Consolidation of traumatic brain injury initiatives in the Department of Defense. Health Affairs Memorandum dated March 23, 2007. Department of Defense: Washington, DC, 2007.

- [31] French L, McCrea M, Baggett M. The Military Acute Concussion Evaluation (MACE). *J Special Operations Med* 2008;8:68–77.
- [32] Johnson VE, Stewart W, Smith DH. Widespread tau and amyloid-beta pathology many years after a single traumatic brain injury in humans. *Brain Pathol* 2012;22:142–9.
- [33] Grundke-Iqbali I, Iqbal K, Tung YC, Quinlan M, Wisniewski HM, Binder LI. Abnormal phosphorylation of the microtubule-associated protein tau (tau) in Alzheimer cytoskeletal pathology. *Proc Natl Acad Sci U S A* 1986;83:4913–7.
- [34] Goldstein LE, Fisher AM, Tagge CA, Zhang XL, Velisek L, Sullivan JA, et al. Chronic traumatic encephalopathy in blast-exposed military veterans and a blast neurotrauma mouse model. *Sci Transl Med* 2012;4:134ra60.
- [35] Corder EH, Saunders AM, Strittmatter WJ, Schmechel DE, Gaskell PC, Small GW, et al. Gene dose of apolipoprotein E type 4 allele and the risk of Alzheimer's disease in late onset families. *Science* 1993;261:921–3.
- [36] Zhou W, Xu D, Peng X, Zhang Q, Jia J, Crutcher KA. Meta-analysis of *APOE4* allele and outcome after traumatic brain injury. *J Neurotrauma* 2008;25:279–90.
- [37] Freeman T, Roca V, Guggenheim F, Kimbrell T, Griffin WS. Neuropsychiatric associations of apolipoprotein E alleles in subjects with combat-related posttraumatic stress disorder. *J Neuropsychiatry Clin Neurosci* 2005;17:541–3.
- [38] Scarmeas N, Stern Y. Cognitive reserve and lifestyle. *J Clin Exp Neuropsychol* 2003;25:625–33.
- [39] Kremen WS, Koenen KC, Boake C, Purcell S, Eisen SA, Franz CE, et al. Pretrauma cognitive ability and risk for posttraumatic stress disorder: a twin study. *Arch Gen Psychiatry* 2007;64:361–8.
- [40] Fay TB, Yeates KO, Taylor HG, Bangert B, Dietrich A, Nuss KE, et al. Cognitive reserve as a moderator of postconcussive symptoms in children with complicated and uncomplicated mild traumatic brain injury. *J Int Neuropsychol Soc* 2010;16:94–105.
- [41] Zetterberg H, Hietala MA, Jonsson M, Andreasen N, Styrud E, Karlsson I, et al. Neurochemical aftermath of amateur boxing. *Arch Neurol* 2006;63:1277–80.
- [42] Neselius S, Brisby H, Theodorsson A, Blennow K, Zetterberg H, Marcusson J. CSF-biomarkers in Olympic boxing: diagnosis and effects of repetitive head trauma. *PLoS One* 2012;7:e33606.
- [43] Blennow K, Jonsson M, Andreasen N, Rosengren L, Wallin A, Hellstrom PA, et al. No neurochemical evidence of brain injury after blast overpressure by repeated explosions or firing heavy weapons. *Acta Neurol Scand* 2011;123:245–51.
- [44] Mac Donald CL, Johnson AM, Cooper D, Nelson EC, Werner NJ, Shimony JS, et al. Detection of blast-related traumatic brain injury in U.S. military personnel. *N Engl J Med* 2011;364:2091–100.
- [45] Weiner MW, Veitch DP, Aisen PS, Beckett LA, Cairns NJ, Green RC, et al. The Alzheimer's Disease Neuroimaging Initiative: a review of papers published since its inception. *Alzheimers Dement* 2012;8:S1–68.
- [46] Rowe CC, Villemagne VL. Brain amyloid imaging. *J Nucl Med* 2011;52:1733–40.
- [47] Jack CR Jr, Knopman DS, Jagust WJ, Shaw LM, Aisen PS, Weiner MW, et al. Hypothetical model of dynamic biomarkers of the Alzheimer's pathological cascade. *Lancet Neurol* 2010;9:119–28.
- [48] Stomrud E, Hansson O, Zetterberg H, Blennow K, Minthon L, Londos E. Correlation of longitudinal cerebrospinal fluid biomarkers with cognitive decline in healthy older adults. *Arch Neurol* 2010;67:217–23.
- [49] Carrillo MC, Bain LJ, Frisoni GB, Weiner MW. Worldwide Alzheimer's disease neuroimaging initiative. *Alzheimers Dement* 2012;8:337–42.

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EXHIBIT 15

The New York Times



May 16, 2012

Brain Ailments in Veterans Likened to Those in Athletes

By JAMES DAO

Scientists who have studied a degenerative brain disease in athletes have found the same condition in combat veterans exposed to roadside bombs in Iraq and Afghanistan, concluding that such explosions injure the brain in ways strikingly similar to tackles and punches.

The researchers also discovered what they believe is the mechanism by which explosions damage brain tissue and trigger the wasting disease, called chronic traumatic encephalopathy, or C.T.E., by studying simulated explosions on mice. The animals developed evidence of the disease just two weeks after exposure to a single simulated blast, researchers found.

“Our paper points out in a profound and definitive way that there is an organic, structural problem in the brain associated with blast exposure,” said Dr. Lee E. Goldstein of Boston University’s School of Medicine and a lead author of the paper, which was published online Wednesday by the peer-reviewed journal *Science Translational Medicine*.

The paper provides the strongest evidence yet that some and perhaps many combat veterans with invisible brain injuries caused by explosions are at risk of developing long-term neurological disease — a finding that, if confirmed, would have profound implications for military policy, veterans programs and future research.

The study could provide a starting point for developing preventive measures for blast-related brain injuries, as well as drug therapies and diagnostic tests for C.T.E., an incurable disease detected only by autopsy.

“The animal model developed by the researchers will enable a better understanding of the brain pathology involved in blast injuries and, ideally, lead to new therapies to help service members and veterans with traumatic brain injuries,” said Dr. Joel Kupersmith, the chief research and development officer for the Department of Veterans Affairs, which helped finance the research.

The paper also seems likely to fuel a debate that has raged for decades over whether veterans who struggle emotionally and psychologically after returning from war suffer from psychiatric problems or brain injuries.

Dr. Goldstein and his co-lead author, Dr. Ann McKee, co-director of the Center for the Study of Traumatic Encephalopathy at Boston University, assert that their paper shows that many of those veterans probably have organic brain injuries and should be given appropriate treatment and disability compensation.

“Not long ago, people said N.F.L. players with behavior problems were just having problems adjusting to retirement,” Dr. Goldstein said. “Now it’s more or less settled that there is a disease associated with their problems. But we do not have that consensus in the military world yet.”

Since 2001, the military has confirmed traumatic brain injury — widely considered the precursor to C.T.E. — in more than 220,000 of the 2.3 million troops who have served in Iraq and Afghanistan, though some experts believe the actual number is higher. There is no way yet of estimating how many of those combat veterans may develop the disease.

Some experts who have read the paper questioned the authors’ conclusions, saying that there was not enough data to conclude that blast exposure leads to C.T.E. Dr. McKee autopsied only four veterans, and three of them had head injuries from multiple sources, making it hard to determine the cause of the disease, they said.

“It’s too small of a sample size,” said Dr. David Hovda, director of the Brain Injury Research Center at the University of California, Los Angeles, and a health adviser to the Pentagon.

But Dr. Hovda said that the growing body of research linking C.T.E. to multiple head injuries was “quite remarkable.”

Dr. Daniel P. Perl, professor of pathology at the Uniformed Services University of the Health Sciences, the military’s medical school, said the study did not convince him that the injuries from blast exposure were identical to head injuries from sports, and he questioned whether data from the mouse research was applicable to humans. But Dr. Perl, who has just started his own project to study the brains of military personnel, called the paper “an important contribution.”

While acknowledging some issues in using mice, Dr. McKee said that animal tests helped resolve a problem scientists face in studying C.T.E.: human patients typically suffer concussions in several ways, whether from car accidents, sports or combat. With mice, the researchers could ensure that the brain damage was caused solely by blast exposure.

C.T.E. causes neurological decay and is linked to memory loss, personality changes, impaired judgment, depression and dementia. A once obscure disorder thought mainly to afflict boxers, it has entered the popular lexicon in recent years as more athletes have received the diagnosis, including David Duerson, the former All-Pro defensive back for the Chicago Bears, who killed himself last year.

The new study out of Boston is just the second time scientists have found C.T.E. in combat veterans. Last fall, a team of researchers led by Dr. Bennet Omalu discovered evidence of the disease in a 27-year-old Iraq war veteran who committed suicide in 2010. The former Marine had reported being close to mortar blasts and roadside bombs in Iraq, but also experienced multiple concussions from contact sports.

JA5400

Dr. Omalu, the chief medical examiner for San Joaquin County, Calif., said he was preparing another paper documenting C.T.E. in eight veterans who had received diagnoses of post-traumatic stress disorder before they died.

Dr. McKee, who directs a brain donation center at the Department of Veterans Affairs medical center in Bedford, Mass., said it took her four years to gain access to the brains of the four veterans. Three of the veterans had single or multiple exposures to blasts, while a fourth had multiple concussions from football and vehicle accidents.

She compared tissue samples from those veterans with the brains of four athletes — three amateur football players and a professional wrestler — three of whom reported multiple concussions and all of whom died in their teens or 20s. She also studied the brains of four people with no record of concussions.

In all the veterans and athletes, Dr. McKee found the signature evidence of early phase C.T.E.: dead or dying neurons, abnormal clumps of a toxic protein and damaged axons, the fibers that transmit signals between nerve cells. She found no evidence of the disease in the people with no reported concussions.

For the animal part of the study, Dr. Goldstein developed a 27-foot-long “shock tube” to simulate explosions. At one end of the aluminum tube the researchers attached a device that uses compressed nitrogen to explode a Mylar membrane, generating force equal to the explosion of a 120-millimeter mortar round. At the other end, they tied down mice, allowing their heads to move freely.

The researchers found that shock waves from the blast moving at more than 1,000 miles per hour had no perceptible effect on brain tissue. But the subsequent blast wind, traveling at 330 m.p.h., shook the skull violently in what the researchers called “bobblehead effect.”

When the scientists examined specially stained tissue from the mouse brains under microscopes just two weeks later, they found the telltale signs of C.T.E.

The scientists also found that mice exposed to blasts showed short-term memory loss and declines in learning capacity just a few weeks later.

But when the researchers immobilized mouse heads during blasts, the mice did not develop learning problems later, suggesting that the brain trauma might be blocked by preventing the head from snapping around during an explosion.

Dr. Hovda said that one implication of the study might be that “traumatic brain injury is not an event that we recover from.”

“Maybe it is the beginning of a series of events that we have to deal with for years,” he said.

As devastating as that news may seem, it may also provide comfort to some military families.

Jennifer Smith, the widow of Michael Smith, the Marine found to have C.T.E. by Dr. Omalu, said she had gained a better understanding of his suicide after researchers told her his emotional problems might have been the result of a brain injury.

In an interview, Ms. Smith said that after her husband returned from his second tour of Iraq in 2009, he had nightmares and mood swings and seemed angry much of the time. (He also had a concussion from playing football in that period.)

Before he hanged himself in 2010, doctors gave him a diagnosis of post-traumatic stress disorder and put him on antidepressant drugs, to no avail, she said.

“He had no control over it,” she said, referring to C.T.E.

EXHIBIT 16

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Continuing coverage of domestic violence cases involving NFL players Ray Rice and Adrian Peterson.



Could Brain Injuries Be Behind the NFL Rap Sheet?

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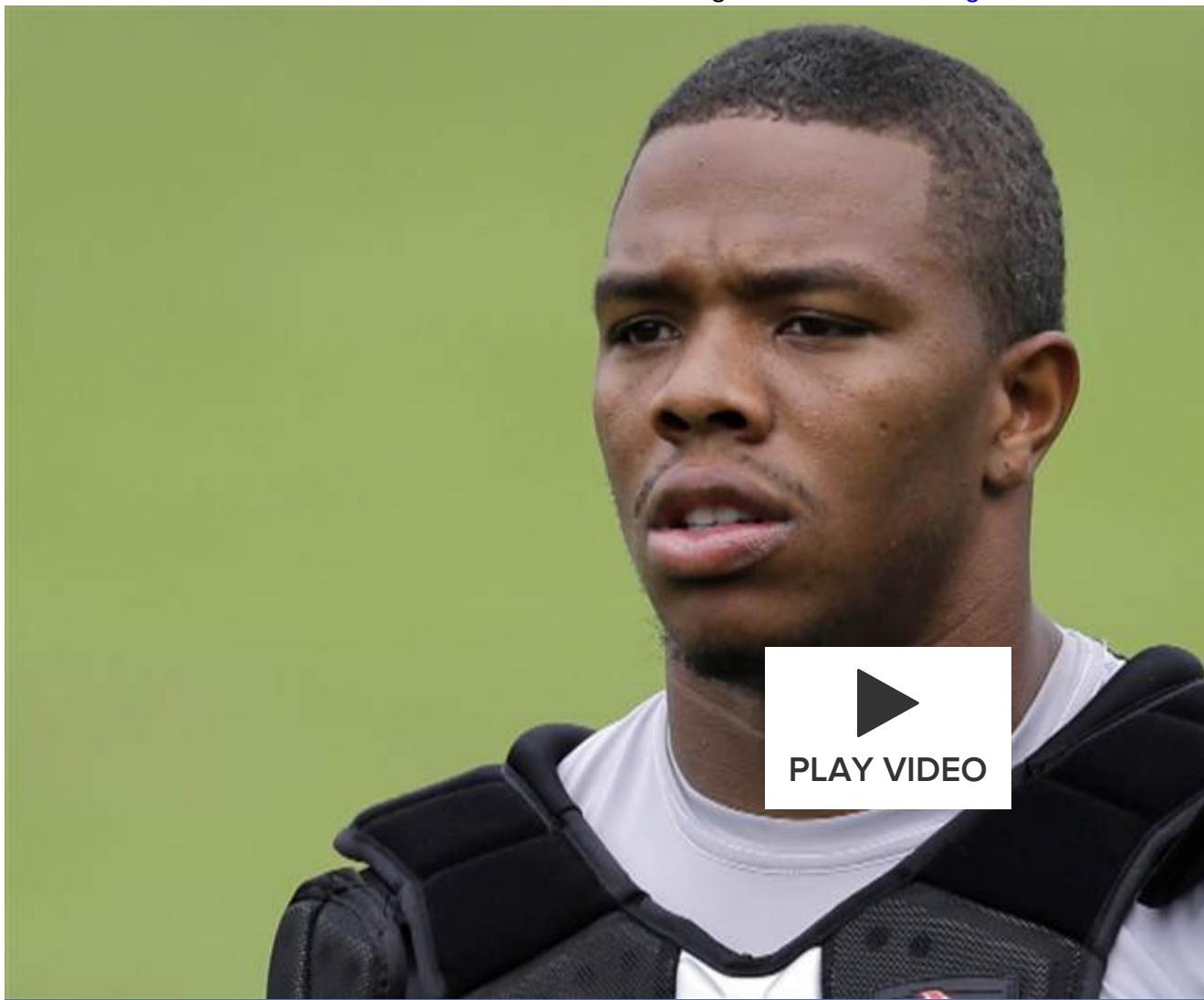
BY LINDA CARROLL

Nobody saw the warning signs before pro wrestler Chris Benoit strangled his wife and smothered his son, before he placed Bibles next to the bodies and hanged himself from a weight machine.

Benoit was known as “mild-mannered” to WWE officials. After the terrible murder-suicide in 2007, some questioned whether steroids or “roid rage” might have been to blame.

But Dr. Julien Bailes diagnosed another problem after looking at his brain: chronic traumatic encephalopathy or CTE — a degenerative disease that is linked to repeated jolts to the brain.

With Ray Rice, Adrian Peterson and a growing number of NFL players involved in domestic abuse grabbing headlines, it's no wonder that some are starting to ask about a possible concussion connection.



NFL Sponsor 'Not Satisfied' With League's Handling of Scandals



NIGHTLY NEWS

Indeed, studies of severe traumatic brain injuries suggest that aggressive behavior might result after repeated concussions.

“Aggression is one of the most common aspects of severe TBI [traumatic brain injury],” said Dr. Douglas Smith, a professor of neurosurgery and director of the Center for Brain Injury and Repair at the University of Pennsylvania. “Generally aggression is thought to be linked to damage to the frontal lobes, which are responsible for executive function. The frontal lobes control things like restraint. Patients are disinhibited and can’t modulate their behavior in general, and that includes aggressive behavior.”

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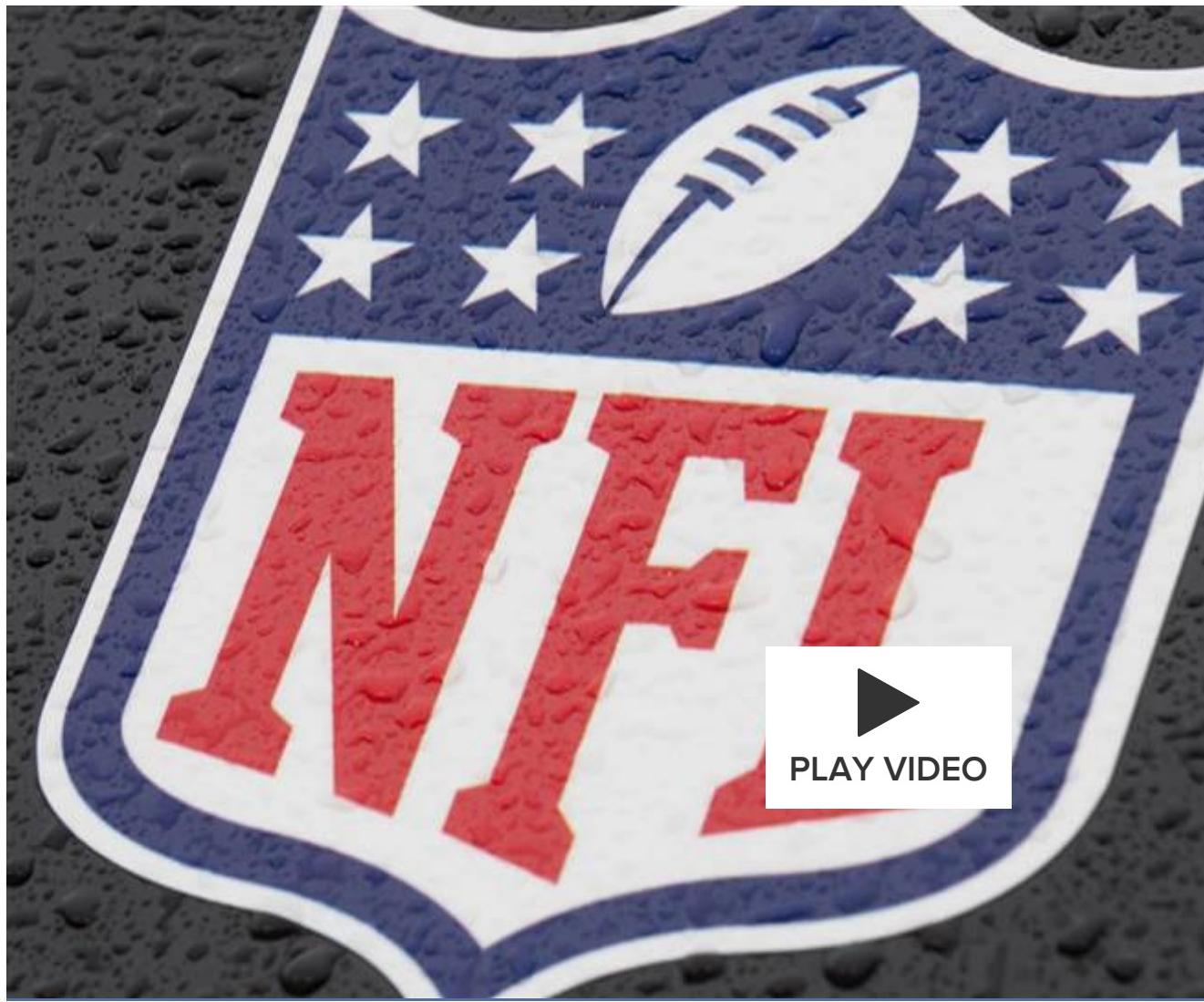
<http://www.nbcnews.com/storyline/nfl-controversy/ray-rice-eligible-play-again-after-winning-appeal-nfl-suspension-n257921>

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But brain injury experts say there is no clear cut link between brain injuries and violence.

"It's a very interesting question," said Dr. Bailes, chairman of the department of neurosurgery at the NorthShore University HealthSystem and co-director of the NorthShore Neurological Institute. "If we're talking about domestic violence and homicide—that has not been typical of CTE."

Bailes has autopsied a number of athletes who were suspected of having CTE and says he can think of only two of those, Benoit and a retired NFL player named Justin Strzelczyk, who seemed to have become violent after a history of concussions. Strzelczyk died in a fiery wreck after a high speed police chase and also was found to have CTE.



NFL Creates All-Female Team to Shape Domestic Violence Policy

JA5406



Bailes, who had been a Steelers team physician when Strzelczyk was on the team, said that the player had undergone a major change in his personality after retirement.

More typical symptoms of CTE include difficulties maintaining relationships, both personal and business, Bailes said, adding that often players with advanced disease spiral into depression and substance abuse and sometimes end up taking their own lives.

But scientists have determined that repeated jolts to the brain can put you in the same place as one big blow to the head, Smith said. Add to that the fact that the frontal lobes are the area of the brain most likely to be damaged in sports like football and you might have a heightened risk of players acting on aggressive impulses.

It's not that repeated blows to the head make a person violent, said David Hovda, a professor of neurosurgery and director of the Brain Injury Research Center at the University of California, Los Angeles. They just might make you less inhibited.

Their effect is probably comparable to the impact of heavy drinking, he said.

"Kind of like when you're intoxicated, where you take away inhibition and then all of a sudden if you have an underlying violent or aggressive personality it's more likely to surface," Hovda said. "I've always said that concussions, or mild traumatic brain injuries, don't just happen to one person, they happen to the entire family."

Still, Smith said, although there seems to be high interest right now with all these sensational stories, there hasn't been enough of a connection between concussion history and aggressive behavior to prompt researchers to actually study the possible link.

Another way to look at it, Hovda said, is to think about the general population.

"If concussions caused violent behavior you'd expect to see millions of people shooting

each other," he said.

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LINDA CARROLL

Linda Carroll is a regular contributor to NBC News. She writes about health and science and her work...

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EXHIBIT 17

Supply and demand analysis of the current and future US neurology workforce

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ABSTRACT

Objective: This study estimates current and projects future neurologist supply and demand under alternative scenarios nationally and by state from 2012 through 2025.

Methods: A microsimulation supply model simulates likely career choices of individual neurologists, taking into account the number of new neurologists trained each year and changing demographics of the neurology workforce. A microsimulation demand model simulates utilization of neurology services for each individual in a representative sample of the population in each state and for the United States as a whole. Demand projections reflect increased prevalence of neurologic conditions associated with population growth and aging, and expanded coverage under health care reform.

Results: The estimated active supply of 16,366 neurologists in 2012 is projected to increase to 18,060 by 2025. Long wait times for patients to see a neurologist, difficulty hiring new neurologists, and large numbers of neurologists who do not accept new Medicaid patients are consistent with a current national shortfall of neurologists. Demand for neurologists is projected to increase from ~18,180 in 2012 (11% shortfall) to 21,440 by 2025 (19% shortfall). This includes an increased demand of 520 full-time equivalent neurologists starting in 2014 from expanded medical insurance coverage associated with the Patient Protection and Affordable Care Act.

Conclusions: In the absence of efforts to increase the number of neurology professionals and retain the existing workforce, current national and geographic shortfalls of neurologists are likely to worsen, exacerbating long wait times and reducing access to care for Medicaid beneficiaries. Current geographic differences in adequacy of supply likely will persist into the future. *Neurology*® 2013;81:470-478

GLOSSARY

AAN = American Academy of Neurology; **ACS** = American Community Survey; **AMA** = American Medical Association; **BRFSS** = Behavioral Risk Factor Surveillance System; **CDC** = Centers for Disease Control and Prevention; **FTE** = full-time equivalent; **ICD-9** = International Classification of Diseases, Ninth Revision; **MEPS** = Medical Expenditure Panel Survey; **MGMA** = Medical Group Management Association; **NNHS** = National Nursing Home Survey; **NRMP** = National Residency Match Program; **PPACA** = Patient Protection and Affordable Care Act.

Neurologists provide care to many of the nation's most vulnerable populations, but indicators point to inadequate patient access to care. The average wait in 2012 for new patients to see a neurologist (34.8 business days) and for follow-up visits (30.0 days) was higher than in 2010 (28.1 days for new and 25.6 for follow-up visits).^{1,2} Other studies report average wait for new patient visits of 24.1 days for neurosurgery, 20.3 for family practice, 16.8 for orthopedic surgery, and 15.5 for cardiology.^{3,4} In 2012, 39% of children's hospitals reported vacancies of 12 months or longer for child neurologists, and child neurology ranked as one of the most short-handed specialties, with average wait times of 45 business days.⁵

While excessive wait times and difficulty recruiting suggest insufficient capacity to provide neurology services, there is substantial uncertainty regarding the future. Rising prevalence of neurologic conditions associated with an aging population, expanded medical coverage under the Patient Protection and Affordable Care Act (PPACA), and the nation's growing reliance on nonphysician

Supplemental data at
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From IHS Healthcare & Pharma (T.M.D., M.V.S., R.C.), Washington, DC; American Academy of Neurology (O.D., C.M.K.), Minneapolis, MN; Vanderbilt University Medical Center (P.D.D.), Nashville, TN; Departments of Health Research & Policy and Neurology & Neurological Sciences (V. W.H.), Stanford University, Stanford, CA; Department of Neurology (H.J.K.), George Washington University, Washington, DC; Fort Wayne Neurological Center (J.C.S.), Fort Wayne, IN; and Elkhart Clinic (T.R.V.), Elkhart, IN.

Go to Neurology.org for full disclosures. Funding information and disclosures deemed relevant by the authors, if any, are provided at the end of the article.

clinicians to provide primary care (many of whom have limited training in neurology) will likely increase demand for neurologists.

This study forecasts neurologist supply and demand through 2025 nationally and by state. Key supply and demand trends are taken into account, with scenarios modeled that consider the implications of neurologist work patterns and number of new neurologists trained.

METHODS The microsimulation approach used to model neurologist supply and demand differs from approaches used historically, including the approach used in a 1998 neurologist workforce study.⁶ We provide a brief overview of the data and methods; appendix e-1 on the *Neurology*[®] Web site at www.neurology.org provides greater detail.

Modeling supply. The approach simulates career choices of neurologists from training through retirement or mortality. Future year projections start with current supply and simulate retirement probability, new graduates, and patient care hours worked. The cycle repeats to simulate subsequent year's supply.

To develop a representative sample of neurologists in each state, we combined information from the 2012 American Academy of Neurology (AAN) database of neurologists, 2008 AAN Member Census File, and 2012 American Medical Association (AMA) Masterfile. The process produces an estimate of 16,366 child and adult neurologists (including residents and fellows, and physicians active in non-patient care activities such as teaching and research) practicing in 2012. This is a relative overestimation of the number of neurologists in practice as residents and fellows require supervision during patient encounters, and academic neurologists and some fellowship-trained neurologists pursue teaching and research and see patients part time.

The 2012 National Residency Match Program (NRMP) data suggest approximately 729 neurologists enter training annually, including 114 child neurology positions.⁷ NRMP data report that international students represent roughly 40% of filled resident positions. Our analysis of AMA data for 2010–2011 suggests approximately 14% of neurology residents have a visa status that might require leaving the United States after training. The average training length of residency is assumed to be 4 years, with 2.8% attrition probability assumed for residents during training.⁸ The age distribution of new residents comes from the AAN's database of neurologists. The computer simulation creates a synthetic population of new graduates each year with each new resident assigned an age, sex (56% male), and child/adult specialty that reflects distributions seen in recent years. The 2011 AAN Resident Survey indicates that 86% of neurology residents plan to enter fellowships following completion of their residency and reports that the majority of fellowships last a year or two.⁹

Retirement patterns for neurologists were estimated using age at retirement for 168 neurologists (ranging from age 54 to 88 years) whose status recently changed to Senior in the AAN's membership files. These patterns were consistent with retirement rates for general internists who participated in a 2006 survey conducted by the Association of American Medical Colleges.¹⁰ Retirement rates are combined with mortality rates from the Centers for Disease Control and Prevention (CDC) to estimate overall attrition, taking into account that mortality rates through age 65 for professional occupations are approximately 25% lower than national rates for men and 15% lower for women.^{11,12} Overall attrition rates suggest that for every 1,000 neurologists entering the workforce, 787 will remain active past age 60, 285 past age 65, and 16 past age 75.

In 2010, neurologists averaged 57.1 professional hours per week, with 42.3 hours in patient care activities. These numbers changed little over the previous decade.¹³ To account for changing demographics of the neurologist workforce, we calculated average patient care hours by age and sex using data from the AAN 2010 Practice Profile Survey merged with the 2008 AAN Census. Women tend to work about 14% fewer hours in direct patient care compared to men of similar age.

Future supply is projected under alternative scenarios:

- The baseline scenario assumes current patterns of retirement and hours worked remain unchanged, 729 new neurologists enter the workforce annually, and the demographics of newly trained neurologists remain unchanged from the current distribution.
- High and low graduate scenarios model the implications of a 10% increase (high scenario) and a 10% decrease (low scenario) in new neurologists trained annually.
- Delayed or earlier retirement scenarios reflect retiring 2 years later or earlier (relative to current patterns).

Modeling demand. Demand projections consider demographic, socioeconomic, and health risk factors for a representative sample of the population in each state for 2010 and projected through 2025. Each person's characteristics are used to forecast his or her use of neurology services by care delivery setting (office, outpatient, emergency, and inpatient). The model then applies neurologist productivity estimates to calculate clinical full-time equivalents (FTEs) required to meet demand for services.

The population database. Population characteristics come from the United States Census Bureau's 2010 American Community Survey (ACS) and population projections, the CDC's 2009 and 2010 Behavioral Risk Factor Surveillance System (BRFSS), and the CDC's 2004 National Nursing Home Survey (NNHS).^{14–18} The population database starts with the approximately 3 million individuals in the ACS, for which we have socioeconomic and demographic data. Health data from the approximately 1,029,000 people in the combined 2009 and 2010 BRFSS files (which covers the noninstitutionalized population) are randomly matched to the noninstitutionalized population in the ACS in the same state, age group, sex, race/ethnicity, income level, and insurance status. Health data from the NNHS are matched to the elderly, institutionalized population in the ACS by age group, sex, and race/ethnicity. The resulting database has over 3 million records and contains demographics (age, sex, race, and Hispanic ethnicity); metro/nonmetropolitan resident; household income; medical insurance type (private, public, self-pay); weight status (unknown, normal, overweight, obese); smoker/nonsmoker status; and diagnosed history of 9 general medical conditions (arthritis, asthma, cardiovascular disease, diabetes, hypertension, depression, heart attack, cancer, and stroke).

With data for approximately 169,000 participants in the combined 2005–2009 files of the Medical Expenditure Panel Survey (MEPS), we used logistic regression to estimate the relationship between patient characteristics and presence of select neurologic conditions: Alzheimer disease, attention-deficit/hyperactivity disorder, cerebral degeneration, epilepsy, extrapyramidal disease not elsewhere classified, mental retardation, migraine, mononeuritis of limb, multiple sclerosis, Parkinson disease, and sleep disorders.¹⁹ These predictive equations were applied to the population database to estimate the probability that each person has the above conditions. Many patient conditions treated by neurologists (e.g., cerebral palsy) are unavailable in the population database. Health care utilization patterns associated with these omitted conditions are captured in the underlying rates of using neurologist services and vary by patient

demographics and the other variables that may be correlated with the presence of these conditions (e.g., Medicaid status).

The predictive equations for health care. Health care seeking behavior is generated from equations using data from the combined 2005–2009 files of the MEPS. Poisson regression quantifies the relationship between patient characteristics and annual number of office visits and annual outpatient visits to a neurologist. Logistic regression is used to calculate the annual probability of an emergency visit and annual probability of hospitalization for neurology-related conditions. Unlike office and outpatient visits, where MEPS specifically identifies the medical professional seen, emergency visits and hospitalizations have no information on medical professionals who provided services. For these settings, we identify neurology visits based on primary ICD-9 diagnosis codes of 320.xx–359.xx (Diseases of the Nervous System). Separate regressions were estimated for adults and children for each care delivery setting. Explanatory variables include patient demographic and health characteristics described previously.

Neurologist workload and care delivery. Estimates of provider time per encounter convert estimates of demand for services into demand for clinical FTEs. Productivity data come from multiple sources:

- The 2010 AAN Practice Profile Survey (n = 910) reports 72.9% of professional time goes to patient care, 9.7% to administrative responsibilities, 9.1% to research, 5.2% to teaching, and 3% to other activities.²⁰ Average patient

encounters per week by neurologists are 17.4 new patient and 34.2 follow-up ambulatory visits; 8.9 new patient and 14.2 follow-up inpatient consults; and 3.8 new patient and 8.5 follow-up inpatient attending encounters.

- The AAN's 2011 Survey of Neurohospitalists (n = 189) reports that each week the average neurohospitalist has 12.6 new patient and 27.7 follow-up attending evaluations, and 18.0 new patient and 30.2 follow-up consulting evaluations.²¹
- The Medical Group Management Association's (MGMA) 2010 Physician Compensation and Production Survey reports that adult neurologists in group practices average 2,205 ambulatory encounters annually (n = 383 neurologists in 118 practices).²² MGMA also reports an annual average 515 hospital encounters. Child neurologists average 1,851 ambulatory encounters per year (n = 38 neurologists in 19 practices) and 380 hospital encounters per year (n = 29 neurologists in 16 practices).

Combined with information on the average work relative value unit for new patient and follow-up visits in office/outpatient (2.43 for new patient visit level 4 and 0.93 for established patient visit level 3) and hospital settings (2.61 for initial hospital care level 2 and 1.39 for subsequent care) and after model calibration (to account for fewer patient visits among academic neurologists), we calculate that each 2,860 ambulatory visits equates to approximately one clinical FTE, and each 1,580 hospital consults equates to approximately one clinical FTE, representing about 42.3

Figure 1 Estimated supply and demand for neurologists: 2012

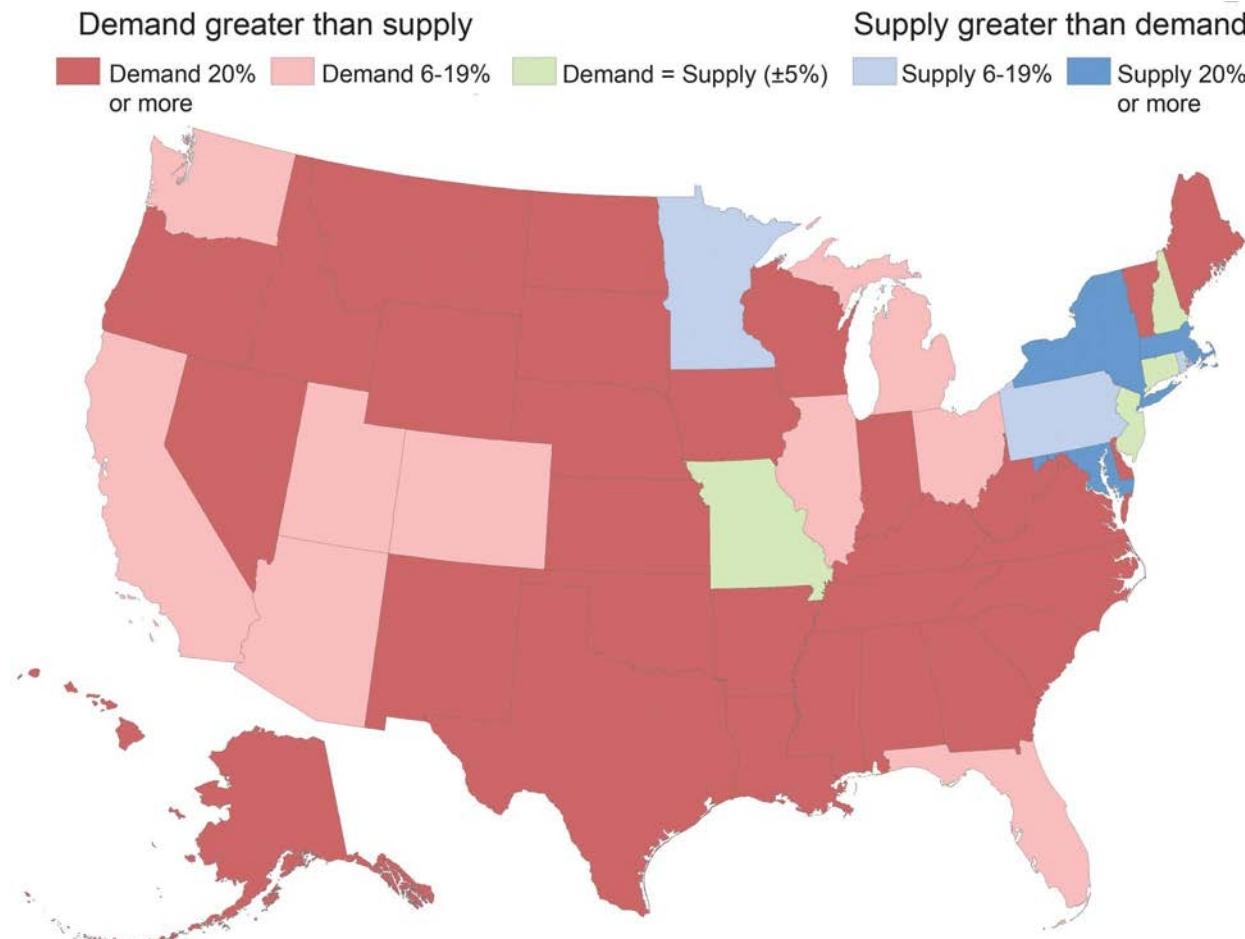


Table Estimated supply and demand for neurologists by state: 2012-2025^a

State	2012			2014 PPACA demand impact	2025		
	Supply	Demand	Gap		Supply	Demand	Gap
AK	24.4	38.1	13.7	1.5	30	46	16
AL	185.3	295.6	110.3	8.6	207	334	127
AR	98.3	178.7	80.4	7.8	109	210	101
AZ	336.4	381.7	45.3	8.8	444	547	103
CA	1,650.6	1,935.5	284.9	56.1	1,811	2,309	498
CO	237.8	281.7	43.9	8.4	259	330	71
CT	218.4	223.2	4.8	3.6	231	239	8
DC	128.7	34.4	(94.3)	0.5	114	31	(83)
DE	38.8	56.1	17.3	0.9	43	66	23
FL	956.7	1,110.8	154.1	44.2	1,235	1,544	309
GA	391.4	544.2	152.8	21.3	487	684	197
HI	51.5	64.7	13.2	0.9	58	72	14
IA	109.0	189.2	80.2	2.2	116	200	84
ID	43.4	91.2	47.8	2.7	60	117	57
IL	662.0	755.3	93.3	18.4	669	818	149
IN	264.5	423.8	159.3	10.9	286	475	189
KS	113.2	170.1	56.9	3.6	122	188	66
KY	158.2	274.3	116.1	10.3	177	313	136
LA	223.1	269.0	45.9	10.2	234	305	71
MA	799.0	430.0	(369.0)	1	805	463	(342)
MD	548.0	341.2	(206.8)	7.7	551	402	(149)
ME	64.8	91.5	26.7	1.7	63	104	41
MI	556.2	631.1	74.9	15.3	612	698	86
MN	391.3	325.5	(65.8)	4.6	432	381	(51)
MO	365.9	379.6	13.7	10.5	381	432	51
MS	97.0	180.1	83.1	6.4	113	210	97
MT	41.0	59.1	18.1	2.3	51	70	19
NC	469.7	582.2	112.5	17.4	575	735	160
ND	22.2	39.9	17.7	0.9	20	42	22
NE	67.8	105.1	37.3	2.3	70	114	44
NH	86.2	83.5	(2.7)	1.8	93	102	9
NJ	497.8	509.7	11.9	12.8	532	567	35
NM	75.5	108.5	33.0	4.9	88	126	38
NV	71.9	150.5	78.6	5.3	108	215	107
NY	1,642.6	1,130.6	(512.0)	24.9	1,621	1,190	(431)
OH	663.1	740.0	76.9	20.5	694	803	109
OK	105.3	226.5	121.2	7.7	119	254	135
OR	194.6	235.3	40.7	7.6	229	291	62
PA	885.1	816.5	(68.6)	17	889	882	(7)
RI	81.6	67.3	(14.3)	1.4	91	73	(18)
SC	134.2	295.3	161.1	10.1	171	364	193
SD	32.4	48.1	15.7	1.3	31	53	22

Continued

Table Continued

State	2012			2014 PPACA demand impact	2025		
	Supply	Demand	Gap		Supply	Demand	Gap
TN	300.4	390.7	90.3	12.4	358	466	108
TX	1,026.8	1,279.8	253.0	66.1	1,241	1,645	404
UT	134.3	149.1	14.8	4.3	160	191	31
VA	382.5	473.4	90.9	12.2	435	571	136
VT	31.7	41.4	9.7	0.7	34	48	14
WA	351.9	409.2	57.3	6.7	411	508	97
WI	255.4	375.8	120.4	6.4	287	430	143
WV	83.2	133.6	50.4	4.1	88	145	57
WY	15.0	32.5	17.5	0.9	15	37	22
United States	16,366	18,180	1,814	520	18,060	21,440	3,380

Abbreviation: PPACA = Patient Protection and Affordable Care Act.

^aState numbers might not sum to US totals because of rounding.

hours of patient care activity each week. We assume that the proportion of neurologist time spent in patient care remains constant over time.

Defining and estimating current demand. Demand for neurologists is derived from patient demand for services, which is determined in part by patients' willingness and ability to pay for services given patient needs and cost of services. Provider demand is influenced by care delivery patterns. For example, to the extent that primary care providers refer patients to a neurologist rather than try to provide the care themselves, there will be an increased demand for neurologists. Likewise, greater use of advanced practice providers in neurology practices allows neurologists to focus on areas of greatest patient need, thus reducing the overall number of neurologists required to provide care to a given population. There are no established criteria for quantifying demand for physician time; therefore, determining whether there are too many, too few, or about the right number of providers is somewhat subjective.

Nevertheless, for this study demand does not equal "need," where need is based on a clinical definition taking into account patient epidemiologic considerations combined with assessment of how care could best be provided to the patient. Likewise, demand for neurology services does not necessarily equate to use of services, especially in geographic areas with reduced access to neurologists because of supply constraints.

Anecdotal evidence from neurologists we interviewed as part of this study consistently indicated difficulty hiring neurologists or nurse practitioners with training in neurology. While no estimate of the magnitude of a current national shortfall exists, demand appears to exceed supply as indicated by excessive wait times to see a neurologist, difficulty hiring neurologists, and number of practices no longer accepting new Medicaid beneficiaries.¹⁻⁵ That is, we would require more neurologists to reduce the waiting times to see a neurologist to 1-2 weeks from the present wait of 1 month.

Current national demand for neurologists is difficult to estimate directly, but mathematically demand equals current supply plus (minus) any current shortage (surplus). Current supply can be estimated for 2012. Indicators that a shortfall exists are evident (e.g., abnormally long wait times for appointments) but the magnitude of the shortfall is unknown. If one assumed that national supply and demand were in equilibrium in 2012 (i.e., no shortfall), then comparison of current supply to estimated case-mix adjusted

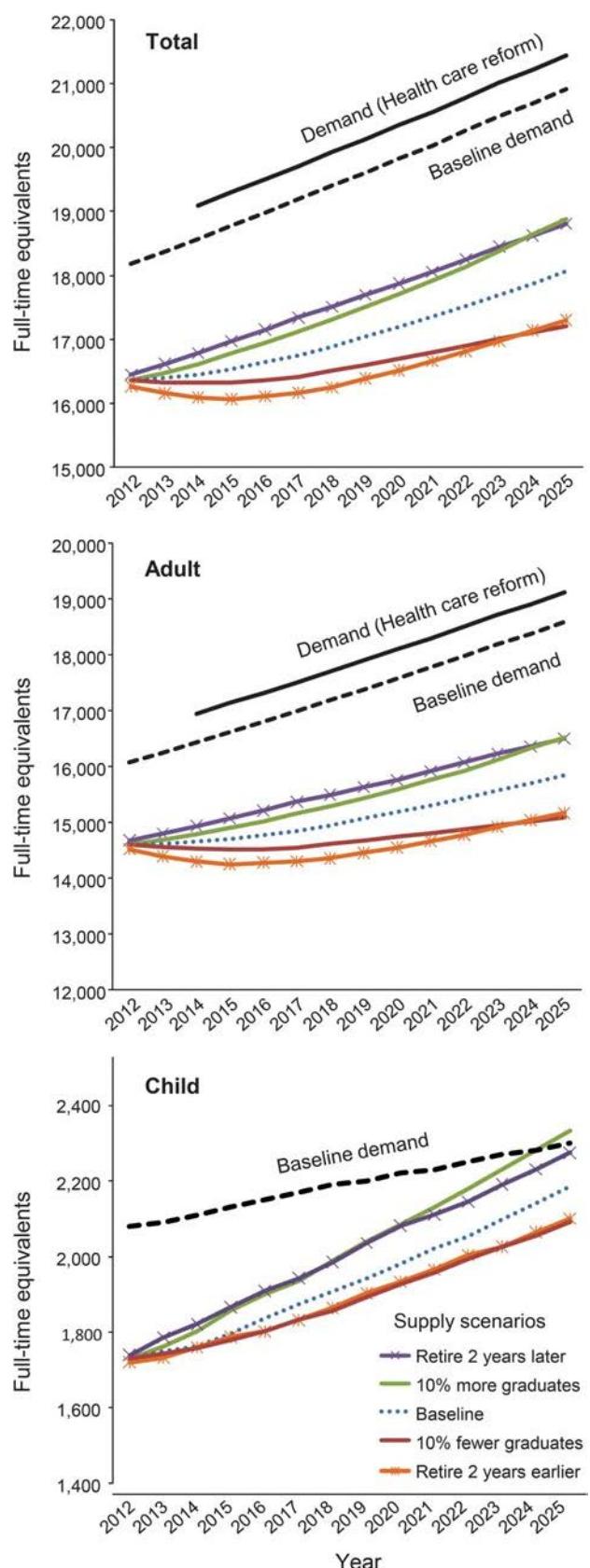
demand in each state would suggest that in 12 states supply exceeds demand, in 3 states (Michigan, Ohio, and Florida) supply and demand are in equilibrium, and in 35 states supply is below demand. Approximately 62% of the nation's population lives in a state where supply is below that required to provide the current national average pattern of care.¹⁶ To bring neurologist supply in these 35 states up to a level sufficient to provide the level of care afforded to the population in Michigan, Ohio, and Florida would take an additional 1,634 neurologists (or approximately 10% more neurologists than current supply). However, even among the 12 states where supply exceeds the level needed to provide the current national average level of care, there are indications of challenges hiring new neurologists. Massachusetts has double the ratio of neurologists per population as the national average, and a 2010 Physician Workforce Study sponsored by the Massachusetts Medical Society indicates the state has a severe shortage of neurologists.²³ Any such shortage in a state with the highest number of neurologists per capita might be explained by the large number of neurologists at nationally recognized academic medical centers in Massachusetts who draw patients from throughout the region. Still, the findings for Massachusetts reiterate that current national supply is insufficient to meet demand. The above findings suggest the nation could readily use an additional 10% adult neurologists, and based on average wait time the current shortfall of child neurologists is substantially greater. For modeling purposes, we assume a 10% shortfall of adult neurologists and a 20% shortfall of child neurologists.

RESULTS The forecasting equations for health care use (see appendix e-1) indicate statistically significant increases in use of neurology services associated with higher age, presence of the various neurology conditions, having insurance, and living in a metropolitan area. Non-Hispanic whites and blacks have significantly higher utilization among adults relative to Hispanics and non-Hispanic other races. Smoking is associated with lower rates of ambulatory visits, but higher rates of emergency visits.

Substantial geographic variation exists in adequacy of supply. Our analysis of the 2012 AMA Masterfile suggests that nationally there are an average of 5.2

Figure 2

Comparison of alternative supply and demand scenarios: 2012–2025



neurologists per 100,000 population. Rates range from 12.1 (Massachusetts, which has a large number of academic medical centers) to 2.6 (Nevada and Wyoming). Using projected demand for each state after simulating demand for a representative sample of the population in each state, we compare supply and demand in 2012 (figure 1, table).

Controlling for demographics and the other health risk factors included in the analysis but assuming that patterns of care use and delivery remain unchanged over time, at the national level, demand grows by approximately 2,740 FTEs, from approximately 18,180 in 2012 to 20,920 by 2025. This includes growth in demand of 220 child and 2,520 adult neurologists.

Under PPACA, an estimated 30 million adults across the United States could gain medical coverage starting in 2014.²⁴ Because individual states have some leeway in how they implement PPACA, the total impact on demand for neurologist services is unknown. However, if the current health care use patterns of adults who would gain medical coverage change to patterns of privately insured adults who have similar health risk characteristics, an additional 520 adult neurologists could be needed starting in 2014 (table).

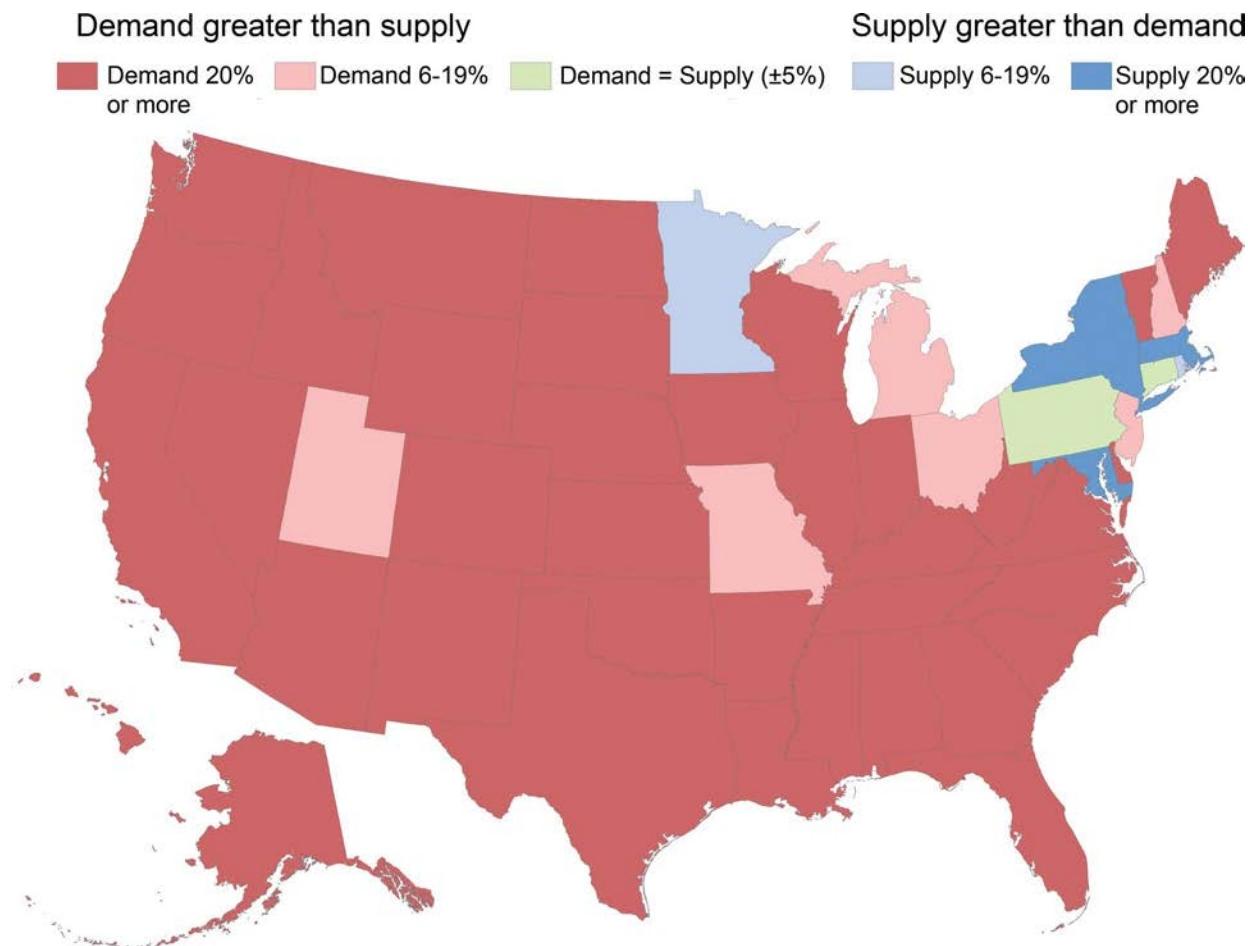
If care utilization patterns for patients in non-metropolitan areas were similar to patterns for similar patients in metropolitan areas, an additional 460 FTE neurologists would be needed in non-metropolitan areas (but this amount is part of the assumed current national shortfall).

Taking into account changing demographics and associated increase in prevalence of neurologic conditions, the national shortfall rises from 11% (the overall shortfall reflecting 10% for adult and 20% for child neurologists) in 2012 to 16% in 2025. With the impact of PPACA, the shortfall rises to 19% by 2025. Even if one assumed that supply and demand currently were in equilibrium at the national level, demand is projected to grow faster than supply.

A comparison of the various supply and demand scenarios projected suggests that even under the most optimistic supply scenario national provider shortfalls are likely to persist (figure 2). For adult neurology under the baseline scenarios, the national shortfall is projected to grow. While supply of child neurologists is growing at a slightly faster rate than is demand, a shortfall is projected to persist through 2025. State-level shortages are projected to persist and grow more severe over time (figure 3).

DISCUSSION This study highlights a current substantial national shortfall of neurologists, especially pediatric neurologists, and even greater shortfalls in select states. Reports of difficulty filling neurologist

Figure 3 Estimated supply and demand for neurologists: 2025 (including Patient Protection and Affordable Care Act impact)



positions, long wait time for scheduling new and follow-up visits, low access to care by Medicaid patients, and our sensitivity analysis all point toward a current national shortfall. Through 2025 demand for neurologists is projected to grow faster than supply, creating a serious limitation of access to care for those patients with neurologic disease. The magnitude of the future shortfall may be even greater than suggested by our findings. As more residents subspecialize (e.g., in sports medicine, as hospitalists, and in neurointensive care), there may be even fewer neurologists to provide care to patients with chronic conditions.

The primary strengths of this study include the following: 1) use of recent data with sufficient sample size to provide reliable estimates of key model parameters; 2) use of state-of-the-art workforce projection models; and 3) ability to forecast state and national supply and demand taking into account geographic variation in prevalence of neurologic conditions. The primary limitations include the following: 1) lack of quantified estimate of the magnitude of the current shortfall, although there is evidence that demand exceeds supply; 2) uncertainty of how care delivery patterns might change over time with emerging care delivery models and greater reliance

on nurse practitioners and physician assistants; 3) uncertainty of whether low (and possibly decreasing) Medicare reimbursement rates will affect specialty choice for new physicians, as well as the impact of continued low reimbursement rates on physician retirement patterns; 4) uncertainty of whether changes in technology or medical intervention will change the way that care is used or delivered; and 5) the overestimation of present and future supply of neurologists when one factors in the duties of neurologic house staff, neurologists in administration positions, and academic neurologists whose capability of seeing patients is curtailed by other responsibilities. Another uncertainty is how expanding enrollments at existing allopathic and osteopathic medical schools and the development of new medical schools will affect the neurology workforce supply.^{25,26} While we model the supply implications of high graduate and low graduate scenarios, potential large reductions in funding for graduate medical education could reduce the number of new graduates by levels even greater than our low graduate scenario.²⁷ This study does not assess neurologist distribution below the state level, and this is an area for future research.

Interviews with neurologists suggest that care delivery patterns likely will change over time, but

the net impact on demand for neurologists is unclear. Under an Accountable Care Organization delivery model coupled with the Patient-Centered Medical Home concept, it is possible that neurologists might play more of a consultative role in patient care management. That is, neurologists might have less direct interaction with patients while providing consultation to primary care doctors and nurse practitioners. Such a scenario might decrease the demand for neurologists. However, the nation is not producing sufficient numbers of new primary care physicians to keep up with demand, many primary care physicians receive relatively little training in basic neurologic diagnosis and in caring for patients with chronic neurologic conditions, and the American Board of Internal Medicine no longer requires a rotation in neurology over a 3-year period of training. Consequently, a greater portion of primary care services might be delivered by nurse practitioners and physician assistants whose training in neurologic disease is even more limited, suggesting that a decrease in demand for neurologists associated with emerging care delivery models seems less probable than either the same or more demand.

Another trend affecting demand for neurologists is greater use of advanced practice nurses and physician assistants. Neurologists interviewed as part of this study indicated that many neurology practices are relying increasingly on nurse practitioners to provide follow-up care to patients, but face difficulty finding extenders with sufficient neurology training.

Despite the study limitations, the models and methods used provide supportive evidence that in many states there is an inadequate supply of neurologists, and that over time the shortfall will persist and increase. These findings underscore the importance of some combination of increasing the supply of neurologists, increasing the supply of nurse practitioners or other physician extenders who can assist with caring for patients with neurologic disease, and finding innovative ways to deliver care that improves provider productivity.

An article discussing the clinical implications of the current and future US neurology workforce will appear in an upcoming issue of *Neurology*®.

AUTHOR CONTRIBUTIONS

T.M. Dall: drafting/revising the manuscript for content, study concept and design, analysis and interpretation of data, acquisition of data, statistical analysis, study supervision. M.V. Storm: drafting/revising the manuscript for content, study concept and design, analysis and interpretation of data, acquisition of data, statistical analysis. R. Chakrabarti: study concept and design, analysis and interpretation of data, statistical analysis. O. Drogan: drafting/revising the manuscript for content, study concept and design, analysis and interpretation of data, acquisition of data, study supervision and coordination, obtaining funding. C.M. Keran: drafting/revising the manuscript for content, study concept and design, analysis and interpretation of data, acquisition of data. Dr. Donofrio: drafting/

revising the manuscript for content, study concept and design, analysis and interpretation of data. Dr. Henderson: drafting/revising the manuscript for content, study concept and design, analysis and interpretation of data. Dr. Kaminski: drafting/revising the manuscript for content, study concept and design, analysis and interpretation of data. Dr. Stevens: drafting/revising the manuscript for content, study concept and design, analysis and interpretation of data. Dr. Vidic: drafting/revising the manuscript for content, study concept and design, analysis and interpretation of data.

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DISCLOSURE

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REFERENCES

1. American Academy of Neurology. 2012 Practice and Payment Trends Survey: Final Report. Minneapolis: American Academy of Neurology; 2012.
2. American Academy of Neurology. 2010 Medical Economics Issues Survey: Final Report. St. Paul: American Academy of Neurology; 2010.
3. Merritt Hawkins and Associates. Survey for Physician Appointment Wait Times. 2009. Available at: www.merrithawkins.com/pdf/mha2009waittimesurvey.pdf. Accessed August 1, 2012.
4. American Association of Neurological Surgeons. Survey on Medicare Participation Among Neurosurgeons. 2010. Available at: www.aans.org/-/media/Files/Legislative%20Activities/MedicareSurveyReport2010Final.ashx. Accessed August 1, 2012.
5. Children's Hospital Association. Pediatric Specialist Physician Shortages Affect Access to Care. 2012. Available at: <http://www.childrenshospitals.net/AM/Template.cfm?Section=Surveys&Template=/CM/ContentDisplay.cfm&ContentID=63293>. Accessed December 22, 2012.
6. Roehrig C, Eisenstein S. Neurology in the Next Two Decades. St. Paul: American Academy of Neurology; 1999.
7. National Residency Match Program. Results and data: 2012 main residency match. Available at: www.nrmp.org/data/resultsanddata2012.pdf. Accessed December 22, 2012.
8. Rocky PH; American Medical Association. Graduate Medical Education: Will Supply Meet Demand? (Presentation citing Pugno PA, AAFP, Annual Rate of Attrition 2005–2009). 2012. Available at: www.uwmedicine.org/education/wwami/

- regional-gme/documents/rockey-national-picture-of-gme.pdf. Accessed December 22, 2012.
9. American Academy of Neurology. 2011 AAN Resident Survey Final Report. St. Paul: American Academy of Neurology; 2011. Available at <http://www.aan.com/globals/axon/assets/9124.pdf>. Accessed June 15, 2012.
 10. Association of American Medical Colleges. The Complexities of Physician Supply and Demand: Projections Through 2025. Washington, DC: Association of American Medical Colleges; 2008.
 11. Arias E. United States Life Tables, 2008: National Vital Statistics Reports. vol 61. no 3. Hyattsville, MD: National Center for Health Statistics; 2012.
 12. Johnson NJ, Sorlie PD, Backlund E. The impact of specific occupation on mortality in the U.S. National Longitudinal Mortality Study. *Demography* 1999;36:355–367.
 13. Adornato BT, Drogan O, Thoresen P, et al. The practice of neurology, 2000–2010: report of the AAN Member Research Subcommittee. *Neurology* 2011;77:1921–1928.
 14. Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System Survey. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2010.
 15. U.S. Census Bureau. Interim State Population Projections 2000–2030 based on Census 2000. Washington, DC: U.S. Census Bureau; 2005.
 16. U.S. Census Bureau. 2010 American Community Survey. Washington, DC: U.S. Census Bureau; 2011.
 17. U.S. Census Bureau. National Population Projections 2012 to 2060 (based on 2010 Census). Washington, DC: U.S. Census Bureau; 2012.
 18. National Center for Health Statistics. The National Nursing Home Survey: 2004 Overview. *Vital Health Statistics* 2009;13. Available at: www.cdc.gov/nchs/data/series/sr_13/sr13_167.pdf. Accessed April 15, 2012.
 19. Agency for Healthcare Research and Quality. 2005–2009 Medical Expenditure Panel Survey. Rockville, MD: Agency for Healthcare Research and Quality; 2011.
 20. American Academy of Neurology. 2010 Practice Profile Form Final Report. St. Paul: American Academy of Neurology; 2010.
 21. American Academy of Neurology. 2011 Neurohospitalist Survey Final Report. 2012. Available at: www.aan.com/globals/axon/assets/9122.pdf. Accessed April 15, 2012.
 22. Medical Group Management Association. Physician Compensation and Production Survey. Englewood, CO: Medical Group Management Association; 2010.
 23. Massachusetts Medical Society. Physician Workforce Study. 2010. Available at: http://www.massmed.org/AM/Template.cfm?Section=Research_Reports_and_Studies2&Template=/CM/ContentDisplay.cfm&CONTENTID=36166. Accessed July 1, 2012.
 24. Buettgens M, Hall MA. Who Will Be Uninsured After Health Insurance Reform? Urban Institute. 2011. Available at: www.urban.org/uploadedpdf/1001520-Uninsured-After-Health-Insurance-Reform.pdf. Accessed September 30, 2012.
 25. Association of American Medical Colleges. Results of the 2011 Medical School Enrollment Survey. Washington, DC: Association of American Medical Colleges; 2012.
 26. Whitcomb ME. New and Developing Medical Schools. New York: Josiah Macy Jr Foundation; 2009.
 27. Nasca TJ, Miller RS, Holt KD. The potential impact of reduction in federal GME funding in the United States: a study of the estimates of designated institutional officials. *J Graduate Med Educ* 2011;3:585–590.

EXHIBIT 18



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League of Denial: The NFL's Concussion Crisis

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Michael Kirk

ANNOUNCER: Tonight on FRONTLINE, the epic story of football's concussion crisis.**HARRY CARSON, Author, Captain For Life:** These players come down with dementia.**ANNOUNCER:** A major FRONTLINE investigation of what the NFL knew and when it knew it.**STEVE FAINARU, FRONTLINE/ESPN:** The level of denial was just profound.**JOIN OUR NEWSLETTER**

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BETH WILKINSON, NFL's Attorney: We strongly deny those allegations that we withheld any information or misled the players.

Dr. MICKEY COLLINS, Univ. of Pittsburgh Medical Ctr.: We don't know who is at risk for it. We don't know if concussion in and of itself is what causes the abnormalities.

ANNOUNCER: A decades-long battle between scientists, players and the nation's most powerful sports league.

BENNET OMALU, M.D., Medical Examiner: You can't go against the NFL. They will squash you.

ANNOUNCER: Next, League of Denial: The NFL's Concussion Crisis.

ANN MCKEE, M.D., Neuropathologist, BU CTE Center: I'm really wondering if every single football player doesn't have this.

FOOTBALL ANNOUNCERS: Erenberg touchdown! Listen to this crowd! They're on fire!

The Steelers have their receivers in, Stallworth on the left, 82, Swann 88 on the right. Franco Harris is down to 30, big pileup.

He fumbled the ball! And let's see— Minnesota has it! Jeff Seamon on it.

Oh, yeah! It's still wild and woolly, and I love 'em that way!

You love 'em wild and woolly, and you're seeing it now.

Impressive drive by the Steelers!

Everybody loves everybody when you win.

The drive is used a lot of times. Here's a roll-out. Bradshaw fires. Stallworth touchdown!

An awesome physical team were the Steelers today, Pittsburgh, the Super Bowl champs!

NARRATOR: Pittsburgh. For 70 years, they've loved their football team, the Steelers.

STAN SAVRAN, Pittsburgh Sports Reporter: This is a tough town. The people here are tough, tough-minded. The way the Steelers played the game meshed perfectly with the people.

STEELERS FAN: Hit 'em! Hit 'em!

STAN SAVRAN: They loved that hard-hitting, punishing, brutal defense that they played.

NARRATOR: They called the defensive line the "steel curtain."

STAN SAVRAN: That just fit perfectly into the way they saw their own lives and what they had to be in order to survive.

NARRATOR: And if there was one iconic Steeler, it was number 52, "Iron Mike" Webster.

JULIAN BAILES, M.D., Team Physician, Steelers, 1988-97: Well, Mike Webster exemplified what it was like to be a player in the Steel City and a player in that era that for me was the greatest team of all time.

NARRATOR: In the 1970s, Webster anchored four Super Bowl championship teams.

BOB FITZSIMMONS, Webster's Attorney: Mike was a legend and a hero. He may have been "the" legend and "the" hero because here's that blue-collar worker, a center, who doesn't get any glory, doesn't catch the touchdown passes, doesn't kick the 52-

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yard field goal to win a game. He's just in every play.

PAM WEBSTER, Wife: I just loved watching him play. And Mike's favorite games were the ones that were cold and snowy and frigid. And he could get up there with his short sleeves. And the dirtier and muddier it got made things better.

NARRATOR: Then 11 years after he retired, the people of Pittsburgh received some bad news.

NEWSCASTER: At what price glory? The Hall of Fame center Mike Webster died at the age of 50.

NEWSCASTER: He died on Tuesday. He was just 50 years old. He was known as "Iron Mike"—

NEWSCASTER: He had heart disease—

NARRATOR: The news that day would start a chain of events that would threaten to forever change the way Americans see the game of football.

NEWSCASTER: It is hard to find a former pro football player whose body hasn't paid a very high price.

NARRATOR: Mike Webster's body was delivered to the Allegheny County coroner's office.

MARK FAINARU-WADA, FRONTLINE/ESPN: Webster ends up in the autopsy room. And the pathologist who's on call that day is this guy, Bennet Omalu.

STEVE FAINARU, FRONTLINE/ESPN: Omalu parked his car and walked into the office. And he said, "What's going on?" And one of his colleagues said, "It's Mike Webster. He's—he's up in the autopsy room." And Omalu's response was, "Who's Mike Webster?"

BENNET OMALU, M.D., Medical Examiner: And everybody looked at me, like, "Where is he from? Is he from outer space? Who is this guy who doesn't know Mike Webster in Pittsburgh?"

MARK FAINARU-WADA: He's a Nigerian-born, incredibly well-educated guy. But he doesn't know anything about football.

NARRATOR: A doctor, Omalu was also a trained neuropathologist. From the beginning of the autopsy, Dr. Omalu could see the effects of 17 years in the football wars.

Dr. BENNET OMALU: Mike looked older than his age. He looked beat up. He looked—he looked worn out. He looked drained. If I had not been told his age, I would say he looked like 70.

NARRATOR: Omalu started at the feet and worked his way up.

STEVE FAINARU: There were cracks running the length of his feet, and they were incredibly painful. And so Webster would duct tape his feet, as well, to sort of close those cracks and keep them—and keep them together.

GARRETT WEBSTER, Son: His feet and his legs were definitely—you could just tell were destroyed. You know, he had veins all over his legs, varicose veins and stuff like that.

NARRATOR: There were several herniated discs, a broken vertebra, torn rotator cuff and separated shoulder.

PAM WEBSTER: His teeth were falling out. His body—he had cellulitis. He had a heart—his heart, you know, was getting enlarged.

COLIN WEBSTER, Son: You know, he was supergluing his teeth back into his head, and he actually made that work. I mean, I think Dad's the only person who could actually, you know, have a medical problem like that and decide to fix it with superglue.

NARRATOR: Then there was the matter of Webster's forehead.

STEVE FAINARU: Webster's forehead was essentially fixed to its scalp. The skin on his forehead had built up almost a shelf of scar tissue that—from the continuous pounding of his head into other people.

NARRATOR: Webster's death certificate made Omalu suspect he may have suffered from a brain disorder.

Dr. BENNET OMALU: When I opened up his skull, in my mind, I had a mental picture of what his brain would look like, based on my education. I was expecting to see a brain with Alzheimer's disease features, so a shriveled, ugly-looking brain. But upon opening his skull, Mike's brain looked normal.

JEANNE MARIE LASKAS, GQ, "Game Brain": He didn't understand why that would be, but he became more and more curious. It became sort of like his little private mission.

NARRATOR: Dr. Omalu wanted to fix the brain, preserve it in a chemical bath for further study.

Dr. BENNET OMALU: I said, "Let me fix this brain. Let me spend time with this brain. There's something—something doesn't match." And I remember the technician telling me, he said, "What are you fixing this brain for? That brain is normal."

STEVE FAINARU: And Omalu becomes very firm in that moment, and he says, "Fix the brain. I want you to fix the brain."

NARRATOR: What Omalu could not see was that hidden inside Webster's brain was evidence of a chronic disease.

STEVE FAINARU: And that decision would change the NFL because if Webster's brain had not been examined, I don't honestly think that we would be where we're at today.

NARRATOR: Steve Fainaru and his brother, Mark Fainaru-Wada, are investigative reporters. Steve has a Pulitzer Prize for reporting in Iraq. Mark broke the Barry Bonds steroids story.

For FRONTLINE, ESPN and in their own book, they've been investigating how the NFL has handled evidence that football may be destroying the brains of NFL players.

[www.pbs.org: Read an excerpt]

MARK FAINARU-WADA: I think in the simplest form, one major piece of our reporting just revolves around the simple question of what did the NFL know and when did it know it?

NARRATOR: The NFL would not cooperate with the Fainaru brothers, nor would it talk to FRONTLINE.

MARK FAINARU-WADA: We went to New York to meet with them and say, "Look, this is what we're doing. We'd like you to participate. We'd like you to make available these various people." And the NFL's message was, "Sorry. We're not going to help you."

NARRATOR: But they continued to report the story, beginning with Mike Webster's career in the NFL.

STEVE FAINARU: There's almost a Darwinian quality about the NFL. Webster wanted to prove to the world that he was going to be the toughest, and he did anything that he

possibly could to do that.

NARRATOR: Webster's Sunday afternoons were spent on the line of scrimmage, brutal territory known as "the pit."

ART ROONEY II, Pittsburgh Steelers President and Co-Owner: He had the violence in him. He could explode into the player. Every play was a fight.

NARRATOR: Webster's favorite weapon was his head.

FRED SMERLAS, Buffalo Bills, 1979-89: Well, Webby would hit you with his head first. And with that head, he'd pop you. And then he'd lift his shoulders. Now he'd get you up in the air. Once you hit full speed and you're moving backwards and he hits you, you're gone.

HARRY CARSON, Author, Captain For Life: When he would fire off the ball, he's coming to block me, and if I'm not ready for him, you know, he's going to pancake me. You know, he's going to hurt me.

NARRATOR: Hall of Fame linebacker for the New York Giants, Harry Carson went to war with Mike Webster.

HARRY CARSON: And so I have to meet force with force. All of my power is coming from my big rear end and my big thighs into my forearm, and I hit him in the face. I have to stun him, get my hands on him, throw him off when I see where the ball is going. And when I hit him in the face, his head is going back. He's going forward, but all of a sudden, his head is going back and his brain is hitting up against the inside of his skull.

ROBERT STERN, Ph.D., Neuropsychologist, Boston University: In football, one has to expect that almost every play of every game and every practice, they're going to be hitting their heads against each other. That's the nature of the game. Those things seem to happen around 1,000 to 1,500 times a year.

Each time that happens, it's around 20G or more. That's the equivalent of driving a car at 35 miles per hour into a brick wall 1,000 to 1,500 times per year.

NARRATOR: For Mike Webster, the head hits just kept on coming for 17 years.

GEORGE ATKINSON, Oakland Raiders, 1968-77: You have to survive, so you learn the methods to survive and be the best at surviving in that environment. The minute you put your pads on, you're only one play away from getting seriously injured.

NARRATOR: For Webster and others on the field, physical injuries went with the territory.

JIM OTTO, Oakland Raiders, 1960-74: I mean, it's affected my life. It surely has. But I'm not out there crying about it. I know that I went to war, and I came out of the battle with what I got. And you know, that's the way it is. That's the way Mike Webster would say it, too. I'm sure he would. I mean, we battled in there, and this is what— this is the result of it right here, sitting right here looking at you.

NARRATOR: But what Otto and others do not know is whether football has also caused injuries they cannot see, the result of what they called getting their bell rung.

ANNOUNCERS: Oh, did they hit him that time! His helmet went off.

I don't know how he held onto that! Sammy White, he did a remarkable catch with Skip Thomas and Jack Tatum jackknifing him as he caught the ball for a first down on the Oakland 45-yard line.

NARRATOR: In 1991, Mike Webster left football. Soon he and his family would come to believe those hits to the head had taken a devastating toll.

PAM WEBSTER, Wife: Mike wasn't Mike. He was angrier quicker than before, and didn't have the patience to have, you know, the kids on his lap or take a walk with the kids. Like, he didn't have that stamina physically.

NARRATOR: Over the years, he became increasingly confused.

COLIN WEBSTER, Son: He would forget, you know, which way the grocery store was, which way it was to go home. He was—he actually—he broke down in tears in front of me a couple of times because he couldn't get his thoughts together and he couldn't keep them in order.

NARRATOR: At home, there were bouts of rage.

PAM WEBSTER: He took a knife and slashed all his football pictures. They were all destroyed and gone and broken glass, and they were all down, you know? And it wasn't Mike.

NARRATOR: They'd been college sweethearts. But 27 years and four children later, Mike and Pam Webster's marriage ended.

PAM WEBSTER: We didn't understand what was happening. You're just trying to get by in this storm. I mean, your money's gone. Your pride's gone. Our bills are all overdue. Our house is getting foreclosed. All this security is gone. All those parameters are removed. So everything's crumbling.

NARRATOR: Once one of Pittsburgh's greatest football heroes, Webster began living out of a pickup truck.

COLIN WEBSTER: I'd come outside sometimes and just see him, you know, sitting in the truck. And it would be freezing and he'd just be sitting there, just looking miserable. He'd say, "You know, the worst thing is, is I'm actually getting to the point where sometimes, or if I don't have my medicine," he said, "I'm cold and I don't realize that I can fix it by putting a jacket on."

NARRATOR: Webster was often unable able to sleep.

SUNNY JANI, Friend: He had a lot of pain, and he hasn't slept for days. So he asked me, said, "Sunny, can you tase me?" I'm, like, "What does that mean?"

So he pulls out this stun gun and goes "Bzz, bzz." I'm, like, "Mike, that's not healthy." He said, "But I haven't slept nothing." He said, "All you got to do is tase me right here." And I'm, like, "OK." I don't know, you know, he's my hero, I'm going to do whatever he tells me. So I tased him, and he goes—and he goes to sleep. I'm, like, "Wow!"

NEWSCASTER: A true champion who wound up homeless, depressed—

NARRATOR: The story of Webster's decline was revealed on ESPN, and then the local newspapers.

NEWSCASTER: He was arrested for forging 19 prescriptions for Ritalin, which he used to combat the erratic behavior caused by—

PAM WEBSTER: I think he was embarrassed. He was a leader on the team. He was Mike Webster. And then to be down to a place of poverty, a place where, you know, your brain can't function to finish a sentence without some help from Ritalin or whatever you need to function for a short period of time.

NARRATOR: For Iron Mike, TV interviews became impossible.

MIKE WEBSTER: No, I'm talking about—no, I'm just trying to find—yeah, well, everybody went through trauma as a kid. I'm not saying I was different than that. I'm just saying—the things we do to one another, OK—

Hell, I don't know what I'm saying. I'm just tired and confused right now, that's why I say I can't really—I can't say it the way I want to say it. I could answer this real easy at other times, but right now, I'm just tired.

COLIN WEBSTER: Maybe the saddest I ever heard him say was when someone saw my dad and, "Aren't you Mike Webster?" And he said, "I used to be." I think that really was how he felt because he really was. He wasn't the same person. It was—it was like, you know, a picture of him that was just shattered into a million pieces.

NARRATOR: Nearly broke, homeless and losing his mind, Webster decided football had hurt him, and the NFL was going to pay for it. In 1997, he went to see a lawyer.

BOB FITZSIMMONS, Webster's Attorney: The thing that struck me the most was how intelligent Mike was, and the problem was that he just couldn't continue those thought patterns for longer than a 30-second period, or a minute or two minutes. He would just go off on the tangents at that point. It was pretty obvious, actually, the first interview that he had some type of cognitive impairment.

NARRATOR: Attorney Bob Fitzsimmons drew up a disability claim against the NFL.

STEVE FAINARU, FRONTLINE/ESPN: He began to assemble a case with Webster to basically say that Webster had suffered brain damage as a result of his 17-year career in the NFL.

NARRATOR: Fitzsimmons pulled together Webster's complicated medical history.

BOB FITZSIMMONS: So I took the binder of records and got four doctors together, four separate doctors, all asking them, "Does he have a permanent disability that's cognitive? And is it related to football?"

NARRATOR: Webster's final application for disability contained over 100 pages and the definitive diagnosis of his doctors—football had caused Webster's dementia. His claim for disability was filed with the National Football League's retirement board.

STEVE FAINARU: The Disability Committee is part of the NFL. The head of the Disability Committee is the commissioner himself, so it's very much a creature of the NFL.

NARRATOR: From the beginning, the league's board was skeptical, reluctant to give Webster money.

COLIN WEBSTER, Son: They were fighting it from the beginning, against just the common sense of, you know, here's this guy, look at him, you know? He played for nearly 20 years in a brutal and punishing sport, and you know, this is what's going on with him. Why would you fight that? What possible motive?

NARRATOR: The league had its own doctor review Webster's case.

BOB FITZSIMMONS: The NFL had not only hired an investigator to look into this, they also hired their own doctor and said, "Hey, we want to evaluate Mike Webster."

NARRATOR: Dr. Edward Westbrook examined him.

MARK FAINARU-WADA, FRONTLINE/ESPN: Dr. Westbrook concurs with everything that the four other doctors have found and agrees that absolutely, there's no question that Mike Webster's injuries are football-related and that he appears to be have significant cognitive issues, brain damage, as a result of having played football.

NARRATOR: The NFL retirement board had no choice. They granted Webster monthly disability payments.

DOCUMENT: —"has determined that Mr. Webster is currently totally and permanently disabled."

NARRATOR: And buried in the documents, a stunning admission by the league's board — football can cause brain disease.

DOCUMENT: —"indicate that his disability is the result of head injuries he suffered as a football player."

BOB FITZSIMMONS: The NFL acknowledges that repetitive trauma to the head in football, football can cause a permanent disabling injury to the brain.

NARRATOR: The admission would not be made public until years later, when it was discovered by the Fainaru brothers.

MARK FAINARU-WADA: And that was a dramatic admission back in 2000. And in fact, when you talk about that later with Fitzsimmons, he describes that as the sort of proverbial smoking gun.

NARRATOR: It was now in writing. The NFL's own retirement board linked playing football and dementia. At the time, it was something the league would not admit publicly. And Webster felt he'd never received the acknowledgment that his years in the NFL had caused his problems.

PAM WEBSTER: Mike would call this his greatest battle. He'd say it was like David and Goliath, over and over, because it was. He was taking on something that was bigger than him. He took on this battle for the right reasons. He was the right person to do it. Unfortunately, it cost us everything.

NARRATOR: Just two years later, in 2002, Mike Webster died.

BROADCAST DIRECTOR: 15 seconds to air. Stand by all cameras. Ready with slow motion and isolated—

NARRATOR: The first broadcast of Monday Night Football in 1970 marked a turning point in the game's popularity and its revenues.

BROADCAST DIRECTOR: Take tape.

MARK FAINARU-WADA: I think the NFL has done an incredible job at marketing itself and turning itself into a spectacle, a sort of cultural part of our lives.

STAN SAVRAN, Pittsburgh Sports Reporter: It fit the personality of a society that became more violent, that became faster, wanted instant gratification.

ANNOUNCER: [ABC "Monday Night Football," 1970] O.J. Simpson gets the call. Look out!

STAN SAVRAN: Football, from the opening kickoff, it's full go.

ANNOUNCER: What a football player!

NARRATOR: The Monday night games were always among the highest rated television broadcasts.

ANNOUNCER: Look out! Look out!

MARK FAINARU-WADA: Monday Night Football — it's not just for football fans.

ANNOUNCER: Speaking of color commentators—

LEIGH STEINBERG, Sports Agent: It became an entertainment show.

ANNOUNCER: [ABC "Monday Night Football," 1983] —vivid picturization of the excitement—

ANNOUNCER: They're number one in the nation.

JA5427

LEIGH STEINBERG: It became a happening.

HANK WILLIAMS, Jr.: [ABC "Monday Night Football," 1996] [singing] Are you ready for some football, a Monday night invasion—

NARRATOR: The glory and the violence of football was beamed into tens of millions of American living rooms during primetime.

HANK WILLIAMS, Jr.: [singing] Here come the hits, the bangs, the blocks and the spikes, because all my rowdy friends drop in on Monday nights!

STAN SAVRAN: People liked the violence of it. You watch a pro football game, and naturally, the biggest cheers are for the touchdowns, but the second biggest cheers are for a nasty hit.

STEVE YOUNG, San Francisco 49ers, 1987-99: And I describe it as the moment of impact, the moment when you actually have to go tackle somebody, it's really a game of will.

LEIGH STEINBERG: The actual logo of Monday Night Football showed helmets hitting together. And it became part of the popular jargon, you know, "He knocked him silly. He knocked him to the moon."

PLAYER: Set the tone! Knock him out! Knock him out! Let's go!

MARK FAINARU-WADA: There's no question the NFL marketed that violence. That's what we love about the game.

NARRATOR: The NFL's own highly crafted film productions celebrated the violence and the spectacle.

[NFL Films]

NFL NARRATOR: On this down and dirty dance floor, huge men perform a punishing pirouette. The meek will never inherit this turf because every play is hand-to-hand and body-to-body combat!

MIKE ORIARD, Kansas City Chiefs, 1970-73: NFL Films captures the essence of football itself, that tension between the violence and the beauty.

NFL NARRATOR: In the pit, there is more violence per square foot than anywhere else in sport!

MIKE ORIARD: The sense of football as something powerful and elemental and mythic and epic.

NFL NARRATOR: When you talk about big-hitting safeties, the Eagles Donnie Dawkins always emerges.

DONNIE DAWKINS: We're going to dominate this thing! Respect is not given—

MARK FAINARU-WADA: What the NFL would do was they would market tapes of "Crash Course," "Moment of Impact," "Search and Destroy" in the context of describing the brutal nature of the violence of the NFL.

NARRATOR: But away from the glamorized hits, there was a darker side. Superagent Leigh Steinberg saw it firsthand.

LEIGH STEINBERG: I watched athletes I represented play with collapsed lungs. I watched them completely fight with doctors at every time to get into the game. I watched players deceive coaches on the sidelines when they were injured and run back into a game.

NARRATOR: The inspiration for the movie sports agent Jerry Maguire, Steinberg was a

JA5428

powerhouse alongside the new NFL.

STEVE FAINARU: He was very much a creature of this expanding juggernaut of the NFL.

MARK FAINARU-WADA: He ends up at one point representing 21 quarterbacks in the — 21 starting quarterbacks in the NFL one year.

NARRATOR: In the early 1990s, Steinberg represented one of football's top stars, Dallas quarterback Troy Aikman.

ANNOUNCER: Second and 14, passing down, coming up for Aikman again—

NARRATOR: In 1994, during the NFC championship, Aikman took a knee to the head.

ANNOUNCER: Down he goes! Stubblefield was there first. Troy Aikman took a knee to the head.

ANNOUNCER: You see it right here. It's Dennis Brown coming in. You see the knee right there, knee right on his helmet.

NARRATOR: Aikman's concussion was bad enough that he could not return to the game. Aikman was taken to a local hospital.

ANNOUNCER: —back to the locker room.

LEIGH STEINBERG: I went to visit Troy, who was sitting in a darkened hospital room all alone.

STEVE FAINARU: The room is dark because Aikman can't even stand looking into the light. It's—you know, it's this sort of surreal scene where the city is celebrating and the quarterback who won the game is in the hospital with his agent.

LEIGH STEINBERG: He looked at me and he said, "Leigh, where am I?" And I said, "Well, you're in the hospital." And he said, "Well, why am I here?" And I said, "Because you suffered a concussion today." And he said, "Well, who did we play?" And I said, "The 49ers." And he said, "Did we win?" "Yes, you won." "Did I play well?" "Yes, you played well." "Did—what does that—and so what's that mean?" "It means you're going to the Super Bowl."

MARK FAINARU-WADA: Five minutes later, they're sitting there, they're continuing to hang out, and Aikman suddenly turns to Steinberg and says, "What am I doing here?" And the next thing you know, they are reliving this conversation they'd had five minutes earlier.

LEIGH STEINBERG: For a minute, I thought he was joking. And I went through the same sequence of answers again. And his face brightened and we celebrated again. Maybe 10 minutes passed, and he looked at me with the same puzzled expression and asked the same sequence of questions.

It terrified me to see how tender the bond was between sentient consciousness and potential dementia and confusion was.

ANNOUNCER: Third down and 9, Young throws, and that's incomplete, and—down!

NARRATOR: 49ers quarterback Steve Young was another one of Leigh Steinberg's clients.

ANNOUNCER: —a sight that is the last thing in the world the 49ers would want to see. It looks as almost as if he's out cold.

ANNOUNCER: Ah, I've been there. And there he is. He's up. That's a good sign. And what I like is he wants to get up off the ground.

ANNOUNCER: Look at this. He looks like he's out cold, and now he's walking off.

STEVE YOUNG, San Francisco 49ers, 1987-99: I remember thinking as I walked to the sidelines, "This is not good," you know? "This is just not the right thing to happen."

NARRATOR: It was young's seventh concussion.

ANNOUNCER: Well, that's a sight we thought would be impossible. Steve Young apparently knocked cold, knocked out cold, walks off the field—

NARRATOR: He would never play again.

STEVE YOUNG: If my knee is hurt, everyone knows it and I know it, and we can go deal with it, and shoulders. And there's only one place in your body that you really don't understand. And people always say the brain is the last frontier.

NARRATOR: For Steinberg, there was a growing recognition of just how dangerous the sport was.

LEIGH STEINBERG: The damage was occurring every week. And I had people who I loved and cared for. And I intuitively knew that this was not just a football issue, that it was happening to football players in the pros, it was happening in college, it was happening in high school. It was happening to every player in every collision sport. So not only was it an issue for my clients, it was a huge societal issue.

[www.More from Leigh Steinberg]

NEWSCASTER: We have put football injuries on the "American Agenda" tonight—

NEWSCASTER: —playing with pain, increasingly the price of life in the National Football League—

NEWSCASTER: We've heard so much recently on the danger of concussions in sports

—

NEWSCASTER: This year, injuries in the National Football League may be out of control—

NARRATOR: By the mid-90s, the concussion crisis had made its way to NFL headquarters on Park Avenue in New York City.

NEWSCASTER: —escalates over the long-term effects of taking hits to head on the football field—

NARRATOR: NFL commissioner Paul Tagliabue orchestrated the league's response. Tagliabue had begun his career as a lawyer.

PETER KEATING, Reporter, ESPN: People have suggested strongly to me that he picked up a lot of techniques about how to aggressively defend things that could turn out to be class actions. You know, the NFL has had this strategy of going nuclear every time it goes to court because the first time you ever lose, you open up the floodgates to potential billions of dollars of damage.

NARRATOR: And Tagliabue said he was skeptical about the risk from concussions, once calling the controversy the result of "pack journalism."

PAUL TAGLIABUE, NFL Commissioner: [Sports panel discussion, December 1994] Concussions I think is, you know, one of these pack journalism issues, frankly. There's no increase in concussions. The number is relatively small. The problem is it's a journalist issue.

LEIGH STEINBERG: This is the commissioner of the NFL saying that there's no concussion issue. If it was ignorance, they should have known. They should have known because the issue is so critical.

JA5430

NARRATOR: Still, Tagliabue created a scientific committee, the Mild Traumatic Brain Injury Committee, the MTBI. To lead it, he chose Elliot Pellman, the New York Jets team doctor, a firm believer that concussions were not a serious problem.

STEVE FAINARU, FRONTLINE/ESPN: And so you had this—behind the scenes, you know, this dynamic going on where you had a guy, Elliot Pellman, who very clearly believed that this wasn't a problem, it just wasn't a big problem for the NFL.

NARRATOR: To outsiders, the choice of Pellman was unusual. He was not an expert in neurology and had no background in brain research.

PETER KEATING: He went to a school in Guadalajara. Dr. Pellman is not a neurosurgeon. He's not a neuro anything. He's a rheumatologist.

STEVE FAINARU: You know, putting a rheumatologist on the head of the committee that arguably was going to have more influence over brain research, you know, than any other—any particular institution in the country at the time, you know, was, I think a lot of people felt, surprising.

NARRATOR: Most of Pellman's committee was made up of NFL loyalists. Nearly half the members were team doctors.

ROBERT CANTU, M.D., Neurosurgeon, Boston University: If you're going to put together a blue ribbon committee to study brain trauma, it should have as its chair somebody who has that as a background, either a neurologist, neurosurgeon, neuropathologist, preferably a clinician.

NARRATOR: For years, Pellman's committee would insist they were studying the problem, that the danger from concussions was overblown.

PETER KEATING: The way the NFL handled this was for 15 years to do research that looks awfully like it was designed to say that the league was OK in doing what it was doing — which wasn't much — to protect players from the dangers of concussions.

NARRATOR: Pellman's committee began writing a series of scientific papers, and in 2003, got the first of them published in the medical journal *Neurosurgery*.

ROBERT STERN, Ph.D., Neuropsychologist, Boston University: Those initial studies from the NFL were notorious in telling the world over and over and over again, "No, there's no relationship between hitting your head in football and later life problems. No, there's no relationship."

NARRATOR: The papers downplayed the risk of concussions—

DOCUMENT: —"Mild TBIs in professional football are not serious injuries."

NARRATOR: —insisted that players could return to the same game after suffering a concussion—

DOCUMENT: "Return to play does not involve a significant risk of a second injury."

NARRATOR: —denied players suffered any long-term problems from concussions sustained while playing football—

DOCUMENT: —"that there was no evidence of worsening injury or chronic cumulative effects of multiple TBIs in"—

NARRATOR: —and in one of the papers, even suggested their research might apply to younger athletes, despite the fact they had not studied high school or college players.

DOCUMENT: "It might be safe for college/high school football players to be cleared to return to play on the same day as their injury."

Dr. ROBERT CANTU: They were making comments which were greatly at odds with

JA5431

prospective, double-blinded studies done at the college and the high school level that just weren't finding the same things. And that just didn't make sense to anyone that's a scientist.

NARRATOR: Dr. Robert Cantu edited the journal's sports medicine section. The papers were published despite his objections.

Dr. ROBERT CANTU: The papers started to make statements about multiple head injuries were not a problem in the NFL. If they went back into the same contest with a concussion, it didn't matter. If they got knocked out and went back into the same contest, it didn't matter. There were no long-term psychological problems or cognitive problems in these athletes, in essence, saying it wasn't a problem.

NARRATOR: Dr. Cantu says he took his concerns to the journal's editor-in-chief, Dr. Michael Apuzzo. Apuzzo was also a consultant for the New York Giants.

Dr. ROBERT CANTU: I said that I really think this data is flawed. I really think it shouldn't be published. He's the one that made the decision to publish papers, no matter whether the reviewers felt they should be published or not, no matter whether the section editor felt they should be published or not.

NARRATOR: Mark Lovell was a member of the committee and an author on some of the studies. He now admits there were problems with the research.

MARK LOVELL, Ph.D., Neuropsychologist: I look back on some of the papers, yeah, I think I could have done it differently. I think the fault of the paper was, it was maybe too early to be making those statements based on a fairly small sample of players, which is the major criticism of the study which I think is a valid one.

NARRATOR: The NFL committee published 16 papers. Neither Dr. Apuzzo, Dr. Pellman, nor Commissioner Tagliabue would speak to FRONTLINE about the papers. But in those articles, the league had issued its definitive denials.

PETER KEATING, Reporter, ESPN: The closer you look, the less this holds up. But it did establish, you know, this kind of impressive-looking set of findings which pushed off the day of reckoning for the league.

That's really what is happening here, right? During this whole run of research that's being published, the day of reckoning, where the league has to answer to somebody about what it's doing about concussions, just keeps getting pushed off and pushed off and pushed off.

NARRATOR: In Pittsburgh at just about this time, Mike Webster's brain tissue was being examined. Dr. Bennet Omalu was studying the microscopic samples.

BENNET OMALU, M.D., Medical Examiner: I put the slides in and looked. Whoa! I had to make sure the slides were Mike Webster's slides. I looked again. Ah! I looked again. I saw changes that shouldn't be in a 50-year-old man's brains, and also changes that shouldn't be in a brain that looked normal.

JULIAN BAILES, M.D., Team Neurosurgeon, Steelers 1988-97: He saw collections of tau protein, collections which shouldn't be there in someone of Mike Webster's age. And this is what jumped out at him as he looked at it through the microscope.

NARRATOR: Dr. Omalu believed he saw physical evidence of the long-term damage playing football could have on the brain. It was a scientific first.

Dr. BENNET OMALU: Because after I looked at it over and over and over and over, I was convinced this was something.

NARRATOR: It was a disease never previously identified in football players, chronic traumatic encephalopathy—CTE.

JA5432

Dr. ROBERT CANTU: Chronic traumatic encephalopathy is a disease, a progressive neuro-degenerative disease, where the end stage leaves tau protein deposition in distinctive areas of the brain, in distinctive locations that separate this disease from any other, like Alzheimer's or some other dementia.

ROBERT STERN: For some reason, the repetitive brain trauma starts this cascade of events in the brain that changes the way this tau looks and behaves. It goes awry. And it starts destroying the integrity of the brain cells.

[www. More about CTE and the brain]

MARK FAINARU-WADA, FRONTLINE/ESPN: The tau is effectively closing in around the brain cells and choking them. And it's impacting the way the brain is working, and ultimately, erupting in issues around memory, agitation, anger.

NARRATOR: Omalu shared his evidence with leading brain researchers, who confirmed his findings. Then he submitted a scientific paper on the Webster case to the one journal that seemed to be most interested in head injuries in football, Neurosurgery, and Dr. Apuzzo accepted it.

STEVE FAINARU: Omalu is a junior pathologist in the Allegheny County coroner's office, but the people he published with were one of the leading Alzheimer's disease experts in the country, one of the leading neuropathologists in the country, and one of the most well-known coroners in the country.

NARRATOR: It was the first hard evidence that playing football could cause permanent brain damage.

JULIAN BAILES, M.D., Team Neurosurgeon, Steelers, 1988-97: Certainly, we knew that if you got hit on the head so many times, maybe you had a 20 percent chance of having dementia pugilistica if you were a former professional boxer. But we didn't really relate that in a modern sport like football, in a helmeted sport, that it could lead to that. And that was the big discovery, I think.

NARRATOR: Dr. Omalu believed the National Football League would want to know about his discovery.

Dr. BENNET OMALU: That was what I thought, in my naive state of mind. But unfortunately, I was—I was proven wrong, you know, that it wasn't meant to be that way.

NARRATOR: In a letter to the journal Neurosurgery, Dr. Pellman and other members of the NFL's MTBI committee attacked Dr. Omalu's paper.

DOCUMENT: "These statements are based on a complete misunderstanding of the relevant medical literature."

NARRATOR: They even questioned whether Mike Webster was suffering from neurological problems.

DOCUMENT:—"that there is inadequate clinical evidence that the subject had a chronic neurological condition"—

PETER KEATING, Reporter, ESPN: The league officials, the doctors and scientists serving on the MTBI committee, not only disputed those findings, they went after Dr. Omalu with a vengeance. They publicly said he should retract his findings.

NARRATOR: The NFL doctors insisted Dr. Omalu was misunderstanding the science of brain injury.

DOCUMENT: "We therefore urge the authors to retract their paper"—

STEVE FAINARU, FRONTLINE/ESPN: It's an extraordinary move under any

JA5433

circumstances. Like, you don't try to get a paper retracted unless there's evidence of fraud or plagiarism or something like that.

DOCUMENT: "Omalu et al's description of chronic traumatic encephalopathy is completely wrong."

PETER KEATING: They went after him with missiles—I mean, like a nuclear missile strike on a guy's reputation. They basically told him to go away and never come back. And that was just for starters.

NARRATOR: In the end, Dr. Omalu's paper was not retracted. And now Omalu had another case.

NEWSCASTER: Terry Long killed himself by drinking anti-freeze.

NARRATOR: A second Steeler had died.

NEWSCASTER: Terry Long committed suicide by drinking anti-freeze.

NEWSCASTER: Terry Long was young—

NARRATOR: And Dr. Omalu received his brain.

Dr. BENNET OMALU: I came to work one morning and everybody there said, "Hey, we have another case for you." I said, "What are you talking about?" They said, "Oh, Terry Long died." I'm, like, "Who's Terry Long?" Said, "Oh, he's another NFL player. He died."

NARRATOR: Long was an offensive lineman with the Steelers for eight years. He battled in the pit alongside Mike Webster.

MARK FAINARU-WADA: He—like Webster, his life had sort of fallen apart in a lot of ways. He had issues, certainly, during his career.

STEVE FAINARU: He was a steroid user. He had been involved in some serious financial problems.

MARK FAINARU-WADA: And so ultimately, he committed suicide by drinking antifreeze.

NARRATOR: As he had for Webster, Dr. Omalu sectioned part of Long's brain and again had it stained.

JEANNE MARIE LASKAS, GQ, "Game Brain": He ran the same test, same stains, found the same splotches, CTE in his brain, too. Now two former Steelers who had gone crazy about the same time.

Dr. BENNET OMALU: When I saw Terry Long's case, I became more convinced that this was not just an anomaly, a statistical anomaly.

NARRATOR: Omalu submitted another paper to Neurosurgery, this one about Terry Long.

JEANNE MARIE LASKAS: That caused the MTBI committee to say, "This is preposterous. This is not good science. This is still not something that we're buying into."

Dr. BENNET OMALU: If you read, Pellman made statements like what I practice is not medicine, it's not science. They insinuated I was not practicing medicine, I was practicing voodoo. Voodoo!

NARRATOR: The NFL would not publicly sit down with Dr. Omalu. But one night, in a private meeting, he brought his CTE slides and finally met face to face with one of the NFL's doctors.

Dr. BENNET OMALU: And the NFL doctor at some point said to me, "Bennet, do you know the implications of what you're doing?" I looked. He was on my left. I said, "Yeah, I think I do." He said, "No, you don't." [laughs] So we continued talking, talking. At some point, he interrupted me again, "Bennet, do you think you know the implications of what you're doing?" I said, "I think I do. I don't know." He said, "No, you don't." So we continued talking again.

Then a third time, he interrupted me, and I turned to him and I said, "OK, why don't you tell me what implications are?" He said, "OK, I'll tell you." He said, "If 10 percent of mothers in this country would begin to perceive football as a dangerous sport, that is the end of football."

[www. Watch on line]

JULIAN BAILES, M.D., Team Neurosurgeon, Steelers, 1988-97: For the most part, people didn't want to believe it's true. They didn't want to admit to themselves or anybody else that our beloved sport, probably our most popular sport, could end up with brain damage. I didn't want to admit it to myself, either. It was a hard message, a difficult message, a bad message, but it appeared to be true.

NEWSCASTER: Owners of the 32 teams—

NARRATOR: Then in New York, a change in the NFL's top leadership.

NEWSCASTER: The NFL will have a new commissioner—

NEWSCASTER: There's a changing of the guard at the National Football League.

NARRATOR: In September of 2006, Commissioner Paul Tagliabue stepped down.

NEWSCASTER: The right-hand man to Tagliabue is running the show.

NEWSCASTER: Tagliabue will be succeeded by Roger Goodell.

NARRATOR: His second in command and closest aide, Roger Goodell, took over. Goodell had grown up in Washington, the son of a United States senator from New York. Early in his career, he worked as former commissioner Pete Rozelle's driver.

MARK FAINARU-WADA: He basically got his job by writing to the commissioner and saying, "Please, I'd like to work in the NFL."

NARRATOR: It took Goodell 24 years to work his way to the top. He was chief operating officer when the league's scientific committee sent those controversial papers to the journal *Neurosurgery*.

STEVE FAINARU: Here's a guy who's spent more than half of his life in the NFL, and more than anyone should be acutely aware of the sort of dangers that are lurking in this problem.

NARRATOR: Now Goodell was fully in charge of the league's handling of the concussion crisis. He soon replaced the rheumatologist Dr. Elliot Pellman and promoted the neurologist Dr. Ira Casson.

PETER KEATING: Dr. Ira Casson, who is an expert, but an abrasive person who is contemptuous of the arguments that concussion can cause damage.

NARRATOR: Casson had once joined Pellman in attacking Omalu's work. Now one of Casson's first moves, a public denial of Omalu's conclusions.

[HBO Real Sports, May 14, 2007]

CORRESPONDENT: Ira Casson leads a team of NFL doctors who did a study of several hundred active players and reported that the concern over head injuries is overblown.

JA5435

Is there any evidence, as far as you're concerned, that links multiple head injuries among pro football players with depression?

IRA CASSON, M.D., Co-Chair, MTBI Committee, 2007-09: No.

MARK FAINARU-WADA: Dr. Ira Casson ends up with this sort of very famous exchange that earns him the nickname "Dr. No."

CORRESPONDENT: With dementia?

Dr. IRA CASSON: No.

CORRESPONDENT: With early onset of Alzheimer's?

Dr. IRA CASSON: No.

JEANNE MARIE LASKAS, GQ, "Game Brain": And Ira Casson was asked repeatedly, "Is there any link between trauma, head trauma, and the kind of dementia we're seeing in these players?" And he says, "No. No. No. No."

CORRESPONDENT: Is there any evidence as of today that links multiple head injuries with any long-term problem like that?

Dr. IRA CASSON: In NFL players?

CORRESPONDENT: Yeah.

Dr. IRA CASSON: No.

NARRATOR: Then just one month later, in Chicago, a dramatic gesture from Commissioner Goodell. At an airport hotel, the league gathered the top NFL brass, team doctors and trainers.

MARK FAINARU-WADA: The NFL convenes a summit in the summer of 2007.

STEVE FAINARU: About 200 people are gathered there, and running the show is Ira Casson. The stakes for the NFL are obvious. It's huge business. If the business is potentially lethal, then that's going to have major implications for the game.

NARRATOR: On this day, the commissioner would take a front row seat to listen to the best medical minds in the league.

PETER KEATING: All the teams are present. All the teams had to send doctors and trainers. And the league's concussion people are there.

NARRATOR: They had even invited outside scientists who had become some of the league's biggest critics. But one person was missing.

PETER KEATING: Dr. Omalu is excluded, just underscoring how they don't want to do business with him.

BENNET OMALU, M.D., Neuropathologist: I was not aware of it. Nobody ever told me. Dr. Bailes called me and said the NFL is putting together a conference on CTE, that you were not invited.

JEANNE MARIE LASKAS: He is shunned. I mean, it was a loud just, "No, not you. Yes, you're the guy with all the research, you're the guy who's published the papers, you're the guy who's got the brains. But no, you're not coming."

NARRATOR: Former Steelers team doctor and neurosurgeon Julian Bailes had become a true believer in CTE and Omalu. They were now research partners. He offered to present Omalu's work to the group.

Dr. JULIAN BAILES: So I presented and showed our data, which was four or five cases

JA5436

NARRATOR: Besides Mike Webster and Terry Long, Omalu also found CTE in the brains of Andre Waters and Justin Strzelczyk. Bailes delivered Omalu's message: Playing football could cause permanent brain damage.

Dr. JULIAN BAILES: It wasn't met with any broad acceptance, to say the least.

STEVE FAINARU: Julian Bailes got up and talked about Omalu's work. And while he's up there, Casson is off to the side and he's rolling his eyes. He's clearly distressed by what he's hearing. And that was basically the idea that was conveyed by the NFL in that moment.

Dr. JULIAN BAILES: There was skepticism. There was dismissiveness on his part. There was great doubt.

NARRATOR: As Bailes left the meeting, he ran into New York Times reporter Alan Schwarz.

ALAN SCHWARZ: I remember Julian being furious, absolutely furious at how they had been treated in that room. And there was clearly— among the NFL committee, there was just a very steadfast belief that this is not a problem. "You guys don't know how to do research the way we do. And thank you for coming."

Dr. JULIAN BAILES: I was not the bearer of good news, probably, in many people's minds. This was not something that I made up. This was showing what the findings were.

NARRATOR: Earlier, Goodell had watched his mentor, Tagliabue, downplay the concussion controversy. Now he had heard firsthand how serious some respected scientists thought the issue was.

MARK FAINARU-WADA: Roger Goodell's on notice. The NFL has a serious issue around the question of concussions, around the issue of brain trauma, on the rising suggestion that there is a link between football and neuro-degenerative disease amongst its former players, and that there is a growing body of science that clearly establishes this link.

NARRATOR: Outside the conference's closed doors, the new commissioner insisted that the NFL had the problem under control.

[June 19, 2007]

ROGER GOODELL: The evidence is that our doctors are making excellent decisions. That's proven by the six-year study that we have and the research that's been done that looks at that issue intensively.

NARRATOR: The head of Goodell's concussion committee, Dr. Ira Casson, took on the critics.

IRA CASSON, M.D., Co-Chair, MTBI Committee, 2007-09: Anecdotes do not make scientifically valid evidence. I'm a man of science. I believe in empirically determined, scientifically valid data. And that is not scientifically valid data.

NARRATOR: Casson insisted there was no evidence that football players were at risk for CTE.

Dr. IRA CASSON: In my opinion, the only scientifically valid evidence of a chronic encephalopathy in athletes is in boxers and in some steeplechase jockeys.

NARRATOR: Dr. Casson declined to be interviewed by FRONTLINE.

ANNOUNCER: This venerable stadium will be a wild scene tonight!

JA5437

NARRATOR: And as the teams took the field just a few months later, in the fall of 2007, the league's definitive statement on brain injury was given to every single player in a pamphlet.

ALAN SCHWARZ, The New York Times: The cover says, "What is a concussion," question mark. It said, you know, "If I get a concussion, am I further at risk for long-term problems?" And the answer was, and I'm virtually quoting, "Research has not shown that there are any long-term consequences to concussions in NFL players as long as each injury is treated properly."

STEVE FAINARU: The message was that football is safe to your brain. That was the message, "Don't worry about it."

[www: Timeline: NFL's changing positions]

NARRATOR: The commissioner and the league had successfully held the line, denying the dangers of football.

ALAN SCHWARZ: They refused to listen to people who didn't share their opinions about the research, and it was very much, you know, putting a stake in the ground saying everybody else is wrong. And that's what they did.

NARRATOR: Shunned by the league, bruised by the struggle and looking to make a change, Dr. Omalu left Pittsburgh. He moved to Lodi, California.

MARK FAINARU: He ends up in the dust bowl of north central California, and he's working as a medical examiner there, as far removed from the NFL as anybody could be, and trying to figure out how to sort of stay in it.

Dr. BENNET OMALU: I wish I never met Mike Webster. CTE has dragged me into the politics of science, the politics of the NFL. You can't go against the NFL. They'll squash you. I really, sincerely wished it didn't cross my path of life, seriously.

ANNOUNCERS: Second and 3, ball on the 3—

In motion, wide open, touchdown!

JANE LEAVY, Journalist: The brains are precious cargo.

ANNOUNCER: Now back to the third, and he goes outside—

CHRIS NOWINSKI, Author of the Book/Film Head Games: We have to get the brain usually within hours of the death.

ANNOUNCER: —scores a touchdown.

Dr. ROBERT CANTU: You have a brain that's intact. It's been removed from the upper spinal cord.

ANNOUNCER: He's at the 40! He's at the 45! Midfield! He's going to go!

NARRATOR: It is the brain of a former football player.

JANE LEAVY: This is a process that is awe-inspiring in the old-fashioned sense of the word.

CHRIS NOWINSKI: You have the responsibility of actually possessing somebody's brain, which is probably the best representation of who they were. You know, you really treat it with the utmost respect.

STEVE FAINARU: From a scientific perspective, there's this secret that's being unlocked.

ANN McKEE, M.D., Neuropathologist, BU CTE Center: We take it out, we weigh it,

JA5438

we photograph it, all the external surfaces.

JANE LEAVY: The attitude is so careful about—that this is a person that's being delivered into their care.

Dr. ANN McKEE: I never forget that the brain is a human being. I feel very privileged that someone has trusted me with this duty.

NARRATOR: In 2008, Dr. Ann McKee was a leading Alzheimer's researcher.

Dr. ANN McKEE: This is what I do. I look at brains. I'm fascinated by it. I can spend hours doing it. In fact, if I want to relax, that's one way I can relax.

NARRATOR: Then one day, she received a phone call from the Boston University medical school.

ROBERT STERN, Ph.D., Neuropsychologist, Boston University: I called her and said, "Are you interested in looking at the brains of former football players?" And she didn't drop a beat and said, "Are you kidding!" I had no idea that she was a super football fan.

Dr. ANN McKEE: I was born with football—my brothers, my dad. I played football when I was a kid. I mean, you know, it was part of life. It's a part of growing up. It's—you know, it's a way of life. So I get it.

NARRATOR: Now Dr. McKee was joining a team of researchers to build on Dr. Omalu's discovery.

MARK FAINARU-WADA: She's learned a little bit about the work that had previously been done in this issue by Omalu and others, and she's eager to find some brains.

NARRATOR: McKee and colleagues from Boston University were determined to examine as many brains as they could, and this man knew how to get them.

MARK FAINARU-WADA, FRONTLINE/ESPN: Chris Nowinski shows up and says, "Look, I'll find the brains for you. I'll bring them to you. And they're going to be football players. Are you interested?" And she says, "Absolutely." You know, she describes it as like the greatest collision on earth for her.

NARRATOR: For Nowinski, the issue of CTE is personal. He worries he has it.

CHRIS NOWINSKI, Author of the Book/Film Head Games: I'd be a fool not to worry about CTE personally. And I took as much brain trauma as anybody. I think I have more than enough reasons to believe that I'm going to be fighting this myself. I am fighting it.

NARRATOR: At Harvard, Nowinski was a punishing tackler. He suffered countless head injuries. Then instead of the NFL, he became a professional wrestler..

MARK FAINARU-WADA: He ends up with the nickname Chris Harvard, the persona of this sort of snobbish wrestler who's smarter than all the fans.

CHRIS HARVARD: You people should be grateful to have someone of my intelligence in your presence!

NARRATOR: For Chris Harvard, the performance often ended with a blow to the head.

CHRIS NOWINSKI: Chris Harvard landed on his head quite a bit. You know, as much as wrestling is performance, there's a very, very small margin of error. And especially when you're learning the thing, you know, you fall on your head a lot.

NARRATOR: Nowinski began to have violent nightmares and migraine headaches.

CHRIS NOWINSKI: And I said, "There's something really wrong with me." And the headache didn't go away for five years.

JA5439

NARRATOR: Brain trauma became an obsession.

CHRIS NOWINSKI: What motivated me every day was the fact that my head was killing me. And I knew that I felt awful. And I knew that I wasn't the only person, but I was a person in a position to make a difference.

NARRATOR: He would take on the task of finding brains of former football players for Dr. McKee.

STEVE FAINARU, FRONTLINE/ESPN: They call him, like, the designated brain chaser, like that's his job, to go out and get the brains.

NARRATOR: Nowinski made the hard calls, asking families to donate the brain of a deceased loved one.

CHRIS NOWINSKI: At the beginning, when I first kind of got up the nerve to do it, you know, I wrote down a script and I prepared, I practiced, mentally preparing myself for wandering into someone's life like this.

NARRATOR: Almost right away, Nowinski secured a portion of the brain of a 45-year-old former Tampa Bay Buccaneer, Tom McHale.

ROBERT STERN: Tom McHale was a brilliant guy, went to Cornell, had been playing football since a kid. His brilliance intellectually was matched by being an incredible athlete.

NARRATOR: Tom and Lisa McHale had three sons. Once his career was over, McHale ran a successful chain of restaurants. But then, uncharacteristically, trouble.

LISA McHALE, Wife: Restlessness, irritability and discontent describe Tom to a T today, but no way is it anywhere near the man I had known and the man I had been married to for years.

JANE LEAVY, Journalist: The change was so diabolical. He became a drug addict. He became depressed. He became—you know, had irate moments of, you know, violent temper.

NARRATOR: McHale's addictions spiraled out of control—pain killers, cocaine.

LISA McHALE: I remember so clearly him looking at me—and this is going back, you know, in the final months of his life—and saying, "Lisa, when I look in your eyes, all I see is disappointment."

And I honestly don't know whether he was seeing my disappointment, or whether it was his own disappointment that he was seeing reflected back. But it pains me to think of how much that hurt him.

NEWSCASTER: A former Tampa Bay Buccaneer was found dead this morning—

NEWSCASTER: A former Tampa Bay Buccaneers player—

NARRATOR: He had died of an overdose. Dr. McKee had read Dr. Omalu's research, but she wanted to see for herself.

ANN McKEE, M.D., Neuropathologist, BU CTE Center: We dissect and section his brain, do a whole series of microscopic slides, look at it with all sorts of different stains for different things, and then come to a conclusion about what the diagnosis is.

NARRATOR: What she saw was that telltale protein, tau.

Dr. ANN McKEE: This is a 45-year-old with terrific disease. I mean, he had florid disease. He has tau in all these regions of the his brain.

NARRATOR: Dr. McKee had examined thousands of brains, but the location of the

JA5440

damage from CTE was different.

ROBERT STERN, Ph.D., Neuropsychologist, BU CTE Center: I remember my feeling. I was scared. I was really scared. It really was a turning point. It was a new understanding that, "Hey, you know, this might be bigger than we think."

NARRATOR: Dr. McKee soon had three brains, all with CTE. But rather than just publish in scientific journals, Chris Nowinski was determined to get the word out.

JANE LEAVY: Nowinski, who is not a scientist, says, "There are people getting hit here. If we speak up now, we may be able to, if not save lives, at least prevent the damage that we are seeing on Ann McKee's table."

NARRATOR: Nowinski decided to take on the NFL in a very public way, at their biggest event, the 2009 Super Bowl.

FAITH HILL, Entertainer: [singing] All right, what a night, it's finally here. Super Bowl Sunday's kicking into high gear—

NARRATOR: The glitz and glamour of the NFL production machine was in full gear, developed over decades—

FAITH HILL: [singing] We've been waitin' all day for a Super Bowl fight—

NARRATOR: —highly choreographed—

FAITH HILL: [singing] —running and hitting with all their might, yeah, everyone's ready for—

NARRATOR: —a national event with a carefully crafted story.

FAITH HILL: [singing] The whole world's ready, kick that ball off the tee because it's Super Bowl rocks on NBC—

NARRATOR: In Tampa, before the big game, Nowinski and McKee tried to crash the festivities by holding a press conference.

MARK FAINARU-WADA, FRONTLINE/ESPN: This is the genius of Nowinski, really, I mean, right? I mean, we're going to present her findings.

Dr. ANN MCKEE: This is something you would never—

MARK FAINARU-WADA: Where do we want to announce that? Oh, let's go to Tampa Bay where the Super Bowl's about to play out, where there's 4,000 media members who are there waiting to watch.

Dr. ANN MCKEE: We have examined thousands of brains, and this is not a normal part of aging. This is not something you normally see in the brain.

MARK FAINARU-WADA: They were saying, "Football caused this. This is an issue." I think McKee uses the word "crisis." She says, "This is a crisis, and anybody who doesn't believe it is in denial."

NARRATOR: Also on the panel, Nowinski's other star, Lisa McHale.

LISA McHALE: Eight months ago, I lost my best friend, my college sweetheart and my husband of 18 years—

NARRATOR: Lisa McHale had decided to go public with her husband's story.

LISA McHALE: I never hesitated to be public with Tom's findings because I was so fully blown away to know that Tom could have had the kind of injury he had to his brain and that it could have been caused by football. And I said, "My God, of course. This is information that I would have like to have had."

NARRATOR: And after her husband's death, McHale decided to become an advocate for Dr. McKee's research.

LISA McHALE: He is now the sixth confirmed case of CTE among former NFL players. And bearing in mind that only six former NFL players have been examined for CTE, I find these results to be not only incredibly significant but profoundly disturbing.

NARRATOR: But that day, there were few reporters listening.

CHRIS NOWINSKI: There were thousands of reporters across the street and probably two dozen who were willing to walk across and learn about CTE.

ROBERT STERN: That was the shocking part. You know, here we were in the midst of everything and this potentially giant story was being told, and virtually no one was there.

CHRIS NOWINSKI: Everyone, thank you so much for your time, and we're available if you want to stick around.

NARRATOR: Nowinski's press conference was no match for the show the NFL was putting on across town.

ANNOUNCER: The build-up is over, and away we go in Super Bowl 43!

NARRATOR: Then one of the most watched television broadcasts in history, a 30-second ad sold for \$3 million. It was the crowning event for a year in which the NFL earned almost \$8 billion.

ANNOUNCER: Here's the run-up, and Super Bowl 43 is under way with the flashbulbs a-poppin'!

MARK FAINARU-WADA: The league is this massive force financially. The Super Bowl is a spectacle. TV is paying huge money to televise the sport.

ANNOUNCER: He gets it away quickly and finds the tight end over the middle, and it's Heath Miller!

STEVE FAINARU: The NFL is broadcast over five networks. ESPN, where we work, their new contract with the NFL is worth almost \$2 billion year. So they're basically paying around \$120 million per game. That's, like, the budget of a Harry Potter movie every week, week in, week out.

ANNOUNCER: And the Pittsburgh Steelers become the first franchise in history to win six Super Bowls!

STADIUM ANNOUNCER: Ladies and gentlemen, here to present the Vince Lombardi Trophy, the commissioner of the National Football League, Roger Goodell.

ROGER GOODELL: Well, some said that we could not top last year's Super Bowl, but the Steelers and Cardinals did that tonight!

NARRATOR: Presiding over it all, the most powerful man in sports.

ROGER GOODELL: —and all the Steelers fans, congratulations on your sixth world championship!

NARRATOR: He sat atop a multi-billion-dollar empire that he was determined to protect.

STEVE FAINARU: One of his mantras was to "protect the shield," the NFL shield, to protect the integrity of the game.

NARRATOR: But now the league might face huge lawsuits and a tarnished image if Dr. McKee's findings about CTE held up.

Not long after her trip to Tampa, Dr. McKee received a phone call.

JA5442

Dr. ANN McKEE: I was called by Ira Casson. And I remember thinking, "Why is Ira Casson calling me?"

STEVE FAINARU: She's intimidated from the start because she knew enough about Ira Casson, she said, to know that he wasn't necessarily a friend.

Dr. ANN McKEE: And he wanted me to come to the NFL office and present the data.

NARRATOR: That May, McKee and Nowinski arrived at NFL headquarters.

CHRIS NOWINSKI: We head on up to a very, very fancy conference room, nice wood paneling, jerseys and trophies in the glass. And it was probably 15 members of the committee.

MARK FAINARU-WADA: And one of the first things McKee notices is that there's only one other woman in the room, and it's not a doctor, it's a lawyer.

PETER KEATING, Reporter, ESPN: A lawyer is not there to offer medical advice. And a lawyer is not there to offer competitive athletic advice, either. A lawyer is there to figure out what the league needs to do to defend itself against a storm that may or may not come, but the league has to be ready to fight.

Dr. ANN McKEE: I'm up against a lot of doubters. I'm up against people who don't think that any of this holds any water. So, fine. I'm just going to show them what I have. And they kept interrupting.

NARRATOR: Dr. Ira Casson and others on the committee expressed their skepticism that playing football was the cause of CTE.

STEVE FAINARU: Very, very quickly, she got serious pushback from Ira Casson and the rest of the committee.

NARRATOR: Indianapolis Colt team physician Dr. Henry Feuer was one of the NFL doctors the meeting.

HENRY FEUER, M.D., MTBI Committee, 1994-2010: I just have a problem. Ann McKee—she cannot tell me where it's starting. We don't know the cause and effect. We don't know that right now. We don't know the incidence.

NARRATOR: The committee members believed Dr. McKee could not answer two important questions. Causation—did football cause CTE? And prevalence—how many players had it.

Dr. HENRY FEUER: She was seeing only those that were in trouble, and we know that there are thousands roaming around that are not having problems. So again, I think that's where we had—we may have had an issue.

JOSEPH MAROON, M.D., MTBI Committee, 2007-10: I think we're very early in the evolutionary understanding of CTE. A certain percentage of the individuals diagnosed with this have had steroid abuse, alcohol abuse, other substances abuses. We don't know the concussion history in many of these. And there may be other confounding factors in terms of the genetics that we simply don't understand.

ANN McKEE, M.D., Neuropathologist, BU CTE Center: They were convinced it was wrong, and I felt that they were in a very serious state of denial.

CHRIS NOWINSKI, Co-Director, BU CTE Center: I remember at one point, one of the NFL doctors asking, you know, "Couldn't you be misdiagnosing this? You know, these all look like they could be frontal temporal dementia." And Ann said, "Well, actually, I was on the NIH committee that defined how you diagnose that disease. So no, they're definitely different diseases." You know, like, she had the experience and they didn't.

NARRATOR: And according to Dr. McKee, there was something else, something

JA5443

familiar about the way the NFL committee was acting.

Dr. ANN MCKEE: I don't want to get into the sexism too much, but sexism plays a big role when you're a doctor of my age who's come up in the ranks with a lot of male doctors. Sexism is part of my life. And getting in that room with a bunch of males who already thought they knew all the answers— more sexism. I mean, you know, it was, like, "Oh, the girl talked. Now we can get back into some serious business."

Dr. HENRY FEUER: I— you know, I don't know why she feels that way. I thought that she presented herself, as I recall — it's been several years — that there was something — something in her manner. And— and I think she's a brilliant woman. She's done a great job. There was just something just about the way she said it. And not that everybody was looking down. You know, it was just—

NARRATOR: Dr. Feuer insists Dr. McKee is mistaken about how she was treated.

Dr. HENRY FEUER: If we for some reason coming— came across as being disrespectful, then I would say that everybody else we interviewed over the 15 years must have felt the same way. That's all I can say about that. And I feel strongly about that, too.

We would just— we would listen, and "Thank you," and that's it. Whether she wanted us to start— you know, I don't know where she's coming from on that.

NARRATOR: The meeting had changed nothing.

Just a few blocks from NFL headquarters, the commissioner had another problem. In a midtown Manhattan restaurant, an internal NFL research document was leaked to a reporter.

ALAN SCHWARZ, The New York Times: Documents were passed to me at Smith and Wollensky's in Manhattan, in an envelope. I mean, it was great — it was very "Deep Throat"— by somebody who shall remain nameless. But he literally slid it across the table in an envelope.

NARRATOR: It was a scientific study of former players commissioned by the National Football League itself.

ALAN SCHWARZ: At the bottom of page 32, there it was, "dementia." And they had asked players, or their representatives, their wives, "Have you been diagnosed by a physician as having Alzheimer's, dementia, or any other memory-related disease?"

ROBERT STERN, Ph.D., Neuropsychologist, BU CTE Center: What it showed was that former NFL players seem to have memory-related disorders at a much, much higher rate than people in the regular community. And here was a study that the NFL supported, and it came out not looking too good for the NFL.

ALAN SCHWARZ: It was the people who the league hired to find out the answers to these questions giving them the answers. And that's what they were. And so you knew that this was going to be big.

NARRATOR: The study went to the heart of the prevalence question. In this case, it showed the prevalence of brain disorders was far higher among football players than the NFL anticipated.

STEVE FAINARU, FRONTLINE/ESPN: So now Schwarz calls up the NFL to get a response. And what he gets from Greg Aiello, the league spokesman, is more denials. They're now denying their own study.

NARRATOR: Aiello insisted the study's design was flawed. But now the NFL's concussion crisis was again national news.

STEVE FAINARU: And so it's becoming almost impossible for the NFL to ignore it.

JA5444

NARRATOR: At the same time, another force was also causing trouble for the NFL and the commissioner, the wives and widows of players with CTE.

JANE LEAVY, Author, *The Woman Who Would Save Football*: I don't think anyone else but the wives, sisters, mothers, daughters, and Ann McKee, could have forced this issue into American consciousness.

NARRATOR: Eleanor Perfetto was one of them. Her husband, Ralph Wenzel, had played for the Pittsburgh Steelers.

ELEANOR PERFETTO, Wife of Ralph Wenzel: As the disease progressed, he went from being ill but fairly functional to getting to the point where he could no longer, you know, dress or feed himself. And in the last year-and-a-half to two years before he died, he couldn't even walk anymore.

NARRATOR: She'd spent years trying to get help from the NFL and its players association. Then Perfetto took matters into her own hands. She showed up uninvited to a league meeting about caring for retired players.

MARK FAINARU-WADA, FRONTLINE/ESPN: There's going to be a meeting that the commissioner is holding with former players. And you know, her husband, suffering, you know, from dementia, obviously can't be represented there by anybody but her. And she's told she's not allowed to enter the room.

NARRATOR: It was the commissioner himself who kept Perfetto out.

ELEANOR PERFETTO: And I said, "I'd like to attend this meeting." And he said, "No, you can't attend. It's only for players. It's not for anyone else." And I said, "But my player — my husband is a player who's severely disabled, and he can't be here right now."

NARRATOR: Nevertheless, the commissioner said no.

NEWSCASTER: The issue is head injuries among players, and if those injuries can lead

—

NARRATOR: As the concussion story received more attention, the coverage helped spark interest in the nation's capital.

NEWSCASTER: Congress considers concussions in the NFL—

NEWSCASTER: Congress is getting into the game. They're looking into the long-term impact—

Rep. JOHN CONYERS, Jr., (D-MI), Judiciary Committee Chairman: The meeting will come to order.

NEWSCASTER: Congress is looking into the long-term impact of concussions.

STEVE FAINARU: Congress saw it as a way to put the NFL's concussion policies on trial in the court of public opinion.

NARRATOR: The commissioner arrived like a celebrity, the star attraction at the hearing and the focus of all the cameras.

PETER KEATING, Reporter, ESPN: Goodell is asked point-blank if he stands by the idea that concussions don't hurt pro football players.

[October 2009]

ROGER GOODELL: Let me address your first question—

PETER KEATING: He can't answer.

ROGER GOODELL: You're obviously seeing a lot of data and a lot of information that

JA5445

our committees and others have presented with respect to the linkage. And the medical experts should be the one to be able to continue that debate.

Rep. JOHN CONYERS: I just asked you a simple question. What's the answer?

ROGER GOODELL: The answer is the medical experts would know better than I would with respect to that, but we—

ALAN SCHWARZ: His consistent response to questions was, "I am not a scientist and any questions about the long-term effects of concussion or head trauma in NFL players are better addressed to scientists."

NARRATOR: One at a time, committee members went after Goodell.

Rep. MAXINE WATERS (D), California: We have heard from the NFL time and time again. You're always studying, you're always trying, you're hopeful. I want to know, what are you doing now?

Rep. LINDA SANCHEZ (D), California: The NFL sort of reminds me of the tobacco companies pre-'90s, when they kept saying, "No, there's no link between smoking and damage to your health or ill health effects."

MARK FAINARU-WADA: The last thing the league wanted to be dealing with in that moment was the analogy to big tobacco. There's nobody in America who doesn't know what that means. That means denial.

STEVE FAINARU: You have the commissioner of the NFL who's being hauled before Congress to answer why his own research arm has been denying since 1994 that football causes brain damage, when everybody from The New York Times to former NFL players, to the respected research scientists are saying, in fact, the opposite is true.

NEWSCASTER: —talked about NFL owners as being like tobacco executives—

NEWSCASTER: —but I think it's seen as being plausible—

NEWSCASTER: —the NFL, similar to what the tobacco industry engaged in—

NARRATOR: Back in New York, with the pressure mounting, the commissioner decided to make some dramatic changes.

[www: The NFL's positions]

NEWSCASTER: The NFL changes its playbook—

NEWSCASTER: New rules for treating athletes with concussions—

NEWSCASTER: NFL commissioner Roger Goodell wants all teams to adhere to a new policy for head injuries—

STEVE FAINARU: They'd just been hauled before Congress and the commissioner was embarrassed by Linda Sanchez. They'd been compared to big tobacco. And they were trying to fight back.

NARRATOR: The commissioner initiated a series of new rules designed to protect players from concussions.

STEVE FAINARU: It was quite obvious what they were doing. They were in the middle of a major damage control operation.

NEWSCASTER: From now on, teams should consider a concussion a game-ending injury.

NARRATOR: Dr. Casson was out.

NEWSCASTER: Dr. Casson resigned from the NFL's concussion committee.

NARRATOR: And a new concussion committee would be formed, led by two prominent neurosurgeons.

NEWSCASTER: The NFL is committed to medical and scientific research—

NARRATOR: And there was one other surprise.

ALAN SCHWARZ: I read on the wire that the NFL had given a million dollars to Boston University. What? And so I called up Chris, like, "What the hell's going on?" He didn't know what was going on. He's, like, "What are you talking about?"

CHRIS NOWINSKI, Co-Director, BU CTE Center: The answer was, "I don't know what you're talking about. This doesn't sound right at all."

ANN McKEE, M.D., Neuropathologist, BU CTE Center: A CBS reporter wanted to know what I thought of the gift of a million dollars. That was the first I heard of it. I was, like, floored.

NARRATOR: And Goodell offered Dr. McKee something she needed even more than money— brains.

MARK FAINARU-WADA: They get a letter from the league. It says you guys are now the NFL's "preferred" brain bank and that the league will help with efforts to direct families to donate the brains of former players to Boston so that they will be studied for CTE.

NEWSCASTER: The National Football League says it will encourage current and former players to donate their brains—

NARRATOR: As the story of the deal broke—

NEWSCASTER: The NFL is donating \$1 million towards the study—

NARRATOR: —the NFL'S spokesman, Greg Aiello, received a call from reporter Alan Schwarz.

ALAN SCHWARZ: While we were talking, he said "It's clear that there are long-term consequences to concussions in NFL players." Now, that kind of statement don't make news if anybody else says it. But this time, it was the league saying it.

STEVE FAINARU: Schwarz stops. You know, he knows that the NFL has not only been denying this for years, that they've never come close to uttering anything even remotely close to this.

ALAN SCHWARZ: And I said, "Greg, you realize that's the first time that anyone associated with the league has made that connection." And I remember, he was a little — I don't— what's the adjective? Annoyed. He was annoyed.

MARK FAINARU-WADA: The Times now suddenly has a huge story, that the NFL has acknowledged a link between brain damage and football. And sure enough, stripped across the top of The Times sports section the next day is that very story.

NARRATOR: At Dr. McKee's research lab, thanks to the NFL's endorsement, the brain bank business was booming.

Dr. ANN McKEE: There were NFL players out there that were talking to their wives and saying, "I think this might be something." You know, "I'm experiencing some problems. And I'm thinking I should donate my brain to this work."

NARRATOR: By 2010, Dr. McKee had looked at the brains of 20 NFL players. She had found CTE in 19 of them. It was during that time that a brain arrived that would dramatically raise the stakes.

JA5447

ROBERT STERN, Ph.D., Neuropsychologist, BU CTE Center: Owen Thomas to me was a critical case. Here we have a 21-year-old who was a hard-hitting lineman from the age of 9 on.

CHRIS NOWINSKI: And then, seemingly out of nowhere, he decided to take his own life. Never been diagnosed with a concussion, never had a problem in the world.

NARRATOR: Owen Thomas had hanged himself in his off-campus apartment. Chris Nowinski secured his brain for Dr. McKee. Without any history of diagnosed concussions, it seemed unlikely he had CTE.

Dr. ANN MCKEE: I was fully prepared to see nothing. I remember late at night looking at the brain and thinking, "Just going to knock this one off." And it just floored me. It just—I just couldn't believe what I was seeing.

NARRATOR: Such an advanced case of CTE had never been found in such a young person.

Dr. ANN MCKEE: In, like, 20 spots in his frontal lobe. He's 21. He's so young. You know, that changes the game to me.

ANNOUNCER: —wrapped up and brought down by Owen Thomas—

NARRATOR: Because he'd never had a diagnosed concussion, Dr. McKee suspected Thomas might have gotten CTE from the everyday sub-concussive hits that are an inherent part of the game.

ANNOUNCER: Another nice play by Owen Thomas—

Dr. ANN MCKEE: Those sub-concussive hits, those hits that don't even rise to the level of what we call a concussion, or symptoms, just playing the game can be dangerous.

ANNOUNCER: A crucial matchup in the AFC—

MARK FAINARU-WADA: McKee is saying, "Look, this is very much an issue at the core of the game, of offensive linemen and defensive linemen pounding the crud out of each other on every single play, on every single down and every single practice, and there's no getting around that."

NARRATOR: It was a controversial theory that raised fundamental questions about the way the game was played.

HARRY CARSON, Author, Captain For Life: The human body was not created or built to play football. When you have force against force, you're going to have injuries. And I'm not talking about the knees and—you know, all of that stuff is a given. But from a neurological standpoint, you're going to have—you're going to have some brain trauma.

NARRATOR: Harry Carson has been studying the matter since he retired 25 years ago.

HARRY CARSON: You know, most people are keyed in on the big hit. But the little mini-concussions are just as dangerous because you might be sustaining six to ten, maybe a dozen of these hits during the course of a game. And you know, if you're going up against top-flight players who are able to perfect those skills of hitting you upside the head, or you know, getting hit with an elbow or—it's one of those things that at some point, you're going to pay for it down the line.

[www: More from Harry Carson]

STEVE YOUNG, San Francisco 49ers, 1984-99: You know, I really worry about my lineman brothers. I really worry for my running back brothers. I mean, that's the truth. We're talking about a nefarious injury, one that you never feel until it's too late. So that's the—that's just—when I look back over 30 years of—associated with football, that's the thing that's most alarming to me.

JA5448

MICHAEL ORIARD, Center, Kansas City Chiefs, 1970-73: The way the game is played, I don't see how you can eliminate all of those routine hits that linemen make every play. How do you eliminate them with—and have the game still be football?

NARRATOR: Back in the lab, McKee had seen another surprising case.

Dr. ANN MCKEE: We had been able to get the brain of an 18-year-old who had died 10 days after suffering his fourth concussion playing high school sports.

NARRATOR: It was the brain of 18-year-old Eric Pelly. A high school senior, a straight-A student, he'd played multiple sports. His dream was to play for the Steelers.

ROBERT CANTU, M.D., Neurosurgeon, BU CTE Center: No one, I think, would have thought that you were going to find chronic traumatic encephalopathy in a high school athlete.

Dr. ANN MCKEE: I was shocked to find that in the brain of this 18-year-old, there were little tiny spots, little tiny areas in the frontal lobe that looked just like this disease.

Dr. ROBERT CANTU: You have an 18-year-old with chronic traumatic encephalopathy. That just shouldn't happen.

Dr. ANN MCKEE: I had an 18-year-old at that time. You know that that brain is supposed to be pristine. The fact that it was there, and he was only playing high school level sports, I mean, I think that's a cause for concern.

NARRATOR: For Dr. McKee and others, it raised the obvious question. How safe is it for children to play football?

YOUTH FOOTBALL TEAM: What time is it? Game time! What time is it? Game time!

HARRY CARSON: From a physical risk standpoint, you know what you are doing when you sign your kid up, that he can hurt his knee, OK? But what you should know now is your child could develop a brain injury as a result of playing football. It's not just on the pro level, it's on every level of football. The question is, do you want it to be your child?

NARRATOR: For Dr. McKee's colleague Dr. Cantu, the controversial answer was that no one under 14 should play tackle football.

Dr. ROBERT CANTU: With what we know about the youth brain compared with the adult brain, that it's more easily disrupted than the adult brain—the youth brain is lighter in weight, so it has less inertia to put it in motion, so you tap a youth head, and his brain moves much quicker than an adult brain that's heavier and therefore has more inertia. So I think we should be treating youths differently.

NARRATOR: And for the BU advocate Chris Nowinski, it was a danger the NFL helped to create.

CHRIS NOWINSKI: As long as the NFL dismissed this, that meant that parents were signing their kids up to go play football, believing that there was no risk. And you know, that wasn't fair to those kids or those parents, but especially those kids.

ANNOUNCER: Let's give him a big round of applause!

NARRATOR: Dr. McKee, who had grown up loving football, has struggled with her feelings about the sport.

Dr. ANN MCKEE: I don't feel that I am in a position to make a proclamation for everyone else.

NEWSCASTER: If you had children who are 8, 10 and 12, would they play football?

Dr. ANN MCKEE: 8, 10, 12? No. They would not.

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NEWSCASTER: Why?

Dr. ANN MCKEE: Because the way football is being played currently that I've seen, it's dangerous. It's dangerous and it could impact their long-term mental health. You only get one brain. The thing you want your kids to do most of all is succeed in life and be everything they can be. And if there's anything that may infringe on that, that may limit that, I don't want my kids doing it.

NARRATOR: McKee's warnings about the danger of the game have made her the subject of sharp criticism.

JANE LEAVY, Author, *The Woman Who Would Save Football*: She's a lightening rod because people see her as the woman out to destroy football as we know it. Probably the most hurtful charge that's been leveled against her is that she's crossed a line from scientist to activist.

NARRATOR: A number of prominent scientists believe she has overstated the dangers of playing football.

PETER DAVIES, Ph.D., Neuroscientist, Feinstein Institute: There's a kind of polarization in that the BU group are clearly the advocates for CTE research. But it's not the only issue. You know, there are other issues that we've got to look at. And how common is this? How many brain traumas do you need to get this? Is this something that everybody will get if they have enough brain trauma? Or is it the result of steroid or drug abuse in a small number of NFL players? We don't know. These are questions, not statements of fact.

NARRATOR: Some researchers say Dr. McKee has examined only a limited sample of players and too few brains to justify her conclusions.

MARK LOVELL, Ph.D., Neuropsychologist: There's been a sense of fear that's been put into parents that "Maybe I shouldn't let my kids play sports." Having said that, I still think it's something that we need to be concerned about. We just need more information on it in terms of, you know, what exactly is the incidence and the risk. Nobody knows that at this point in time. It's still being debated. Depends on who you listen to.

KEVIN GUSKIEWICZ, Ph.D., NFL Head, Neck and Spine Cmte.: Those that have been conducting the autopsies are working with what they have to work with.

I think that we need to learn more about these former athletes, learn more about them during their living years so that we can better understand what their neuro-cognitive function is like, what their emotional status is like. We just have to be careful not to say that this causes that and be able to connect those dots without having more prospective analysis.

Dr. ANN MCKEE: I'm not surprised that people don't believe me. They don't have—they don't look at—they haven't done this work. They haven't looked at brain after brain after brain. I just feel that, I guess, the more cases we get, the more we persevere, the more they hear, eventually, they'll change their mind.

NARRATOR: Still, McKee and her colleagues at BU acknowledge there are limits to her research.

ROBERT STERN, Ph.D., Neuropsychologist, BU CTE Center: Not everyone who hits their head gets this disease. And so a critical question is why does one person get it and another person doesn't. There must be really important variables, genetics, things about the type of exposure to brain trauma people get. We need to figure those things out.

NARRATOR: Dr. McKee admits she's seeing only a small sample.

Dr. ANN MCKEE: I think, to be truthful, even a selection bias in an autopsy sample, even if the family of an individual who's affected is much more likely to donate their brain

JA5450

than a person who had no symptoms whatsoever— given that, we have still been just ridiculously successful in getting examples of this disease.

NARRATOR: Dr. McKee has now examined the brains of 46 former NFL players. 45 had CTE.

Dr. ANN MCKEE: We have an enormously high hit rate. I mean, you know, that would be extraordinary with any other disease, to be able to pull in that many cases just that were suspected. So I think the incidence and prevalence has to be a lot higher than people realize.

NARRATOR: To her, it may be the beginnings of an epidemic.

Dr. ANN MCKEE: I think it's going to be a shockingly high percentage. I'm really wondering where this stops. I'm really wondering, on some level, if every single football player doesn't have this.

911 OPERATOR: 911 emergency.

NARRATOR: And then another death.

MEGAN NODERER: Oh, my God! My boyfriend's been shot! My boyfriend's been shot!

NEWSCASTER: An apparent suicide by a powerful athlete—

911 OPERATOR: Your boyfriend?

MEGAN NODERER: Yes!

NEWSCASTER: A beloved NFL star apparently took his own life today—

911 OPERATOR: What is your boyfriend's name?

MEGAN NODERER: Junior Seau.

NEWSCASTER: Linebacker Junior Seau died today in an apparent suicide—

911 OPERATOR: Where did he shoot himself?

MEGAN NODERER: I can't tell, ma'am. It looks like in the heart.

NEWSCASTER: The untimely death of Junior Seau is provoking questions—

NARRATOR: As the news broke, the question emerged— did CTE play a part in Junior Seau's death?

ANNOUNCER: Here comes Seau! And he's sacked!

ANNOUNCER: All the way back at the...

NARRATOR: He had used his body and his head for 20 years in the NFL. Number 55 was a hard-hitting linebacker. Pain and injury were his specialty. he even bragged about it once on an NFL film.

JUNIOR SEAU: [NFL Films] A perfect hit is when you're faced up, coming one on one, and you hear him go, "Uh"— just a little "Uh."

NARRATOR: He talked about the price he was willing to pay.

JUNIOR SEAU: You have to sacrifice your body. You have to sacrifice years down the line. When we are 50, 40 years old, we probably won't be able to walk. That's the sacrifice that you take to play this game.

NARRATOR: And it had paid off. Seau made millions. He was a philanthropist, beloved in his community. But then a familiar story— his life fell apart.

JA5451

NEWSCASTER: Junior Seau was arrested for domestic violence in Oceanside California early on Monday—

NEWSCASTER: Seau accused of hitting his 25-year-old girlfriend—

NEWSCASTER: Junior Seau drove his SUV right off a cliff in California—

NEWSCASTER: The former pro football star has apparently fallen on hard times—

NARRATOR: At 43, his business empire had imploded.

NEWSCASTER: His behavior changed dramatically—

NARRATOR: He'd lost millions of dollars gambling.

NEWSCASTER: —including compulsive gambling, alcohol abuse—

NARRATOR: He wasted everything.

NEWSCASTER: —and violent, off-the-field incidents.

GINA SEAU, Ex-Wife: We didn't know why he was detached or forgetting, or why he would bark at us for nothing or—we didn't know.

SYDNEY SEAU, Daughter: The past two years have been the roughest. And for a couple months at a time, I wouldn't hear from him at all. And that would scare me.

TYLER SEAU, Son: We got really close, and you know, I feel like it's turning around, OK, he wants to be part of my life. And then, all of a sudden, I wouldn't hear from him.

He's truly a legend, and he will be with us forever—

NARRATOR: Seau was one of the most popular players and out of the league for only two years. His brain became the most sought-after ever.

STEVE FAINARU: You've got a half dozen prominent researchers immediately began to mobilize to try to get their hands on this brain tissue.

GINA SEAU: I can understand where certain groups are saying, "Wow. This guy has played for 20 years. This would be a perfect candidate for us to study and see if he had it."

CHRIS NOWINSKI, Co-Director, BU CTE Center: I spent time making calls. I had, you know, a lot of—we had a lot of mutual friends, spoke to people at his foundation and just said, you know, "We would—like every other case, we would like to review this case, if you want."

NARRATOR: At the same time, far from the action, another researcher had received word of Seau's death.

BENNET OMALU, M.D., Neuropathologist: So when Junior Seau died, just like every other case, people called me. I don't follow football, so I said, "Who is Junior Seau?" They said, "Oh, you don't"—just like Mike Webster, "You don't know Junior Seau?" I'm, like, "How do I?" Said, "Oh, he's even bigger than Mike Webster." They said, "Oh, he just died. He committed suicide."

NARRATOR: Dr. Omalu had been looking for a chance to get back in the game in a big way. He telephoned Seau's son, Tyler, to get consent to take his father's brain.

Dr. BENNET OMALU: We did everything, spoke to the son. He gave us verbal consent. And the medical examiner requested that I come down—they've never had such a big case before, I'm an expert in this field—to help him.

STEVE FAINARU: He gets the first flight out the next morning. When he arrives at the

JA5452

medical examiner's office, he's telling people that he has the verbal consent from Tyler Seau to harvest the brain.

NARRATOR: And it was Omalu who actually removed Seau's brain.

Dr. BENNET OMALU: I assisted at the autopsy. I took out the brain, processed the brain.

STEVE FAINARU: Just as they're finishing up the autopsy, the chaplain comes walking into the room and he says, literally, "Houston, we have a problem." And that problem is that he had just gotten off the phone with Tyler Seau, and according to Tyler, the NFL informed him that Omalu's research is bad and that his ethics are bad, that he's essentially unethical.

TYLER SEAU: People started saying things about Omalu, kind of telling me the kind of character that he has. And you know, I got a lot of email about it. But at that point, I was just kind of— you know, I don't want to hear all these things.

Dr. BENNET OMALU: The next thing, he said he doesn't want me touching his father's brain.

STEVE FAINARU: At that point, there's nothing else to do except leave. I mean, he just walks out of the room, and he takes his empty brain briefcase and he gets back on the plane, and he goes back to San Francisco without having any success.

Dr. BENNET OMALU: So I was very demoralized, I remember that day I was. People didn't notice. When I got into the cab I was crying. I mean, what have I done?

NARRATOR: Junior Seau's brain was sent to the National Institutes of Health, the NIH.

MARK FAINARU-WADA: The NFL very directly worked not only to get the brain to NIH, but in this case, to keep it away from Omalu's group or McKee's group by speaking badly about them.

NARRATOR: NFL doctors say the decision was made purely in the interest of science.

KEVIN GUSKIEWICZ, Ph.D., NFL Head, Neck and Spine Cmte.: Getting it into the hands of good science is their—the goal there. So yes, I think that was probably what was driving the suggestion that "Let's have NIH get involved."

NARRATOR: The final diagnosis in Seau's case was national news.

NEWSCASTER: ABC News and ESPN have learned exclusively Seau's brain—

NARRATOR: He had CTE.

NEWSCASTER: —visible signs of CTE, chronic traumatic encephalopathy—

NARRATOR: In the months following Seau's death, the NFL went on the offensive. The commissioner helped to promote a youth football safety initiative, the Heads Up program. The league donated \$30 million dollars to the NIH to study sports injuries, including joint disease, chronic pain and CTE.

ROGER GOODELL, NFL Commissioner: We recently committed \$30 million to the National Institutes of Health—

PETER KEATING, ESPN Reporter: Good PR is one part of the NFL strategy. But the other piece of it is that the NFL wants to come off as being very forward-looking. The NFL wants to keep pushing these questions into the future, keep the discoveries going, make it seem like these questions that still need to be resolved are things that the league is working with doctors and researchers on.

NARRATOR: It was a message the commissioner himself delivered, granting a rare TV news interview the morning of the Super Bowl.

JA5453

BOB SCHIEFFER, CBS News Face the Nation: [February 3, 2013] I'm going to ask you this question because some widows of some NFL players have asked me to ask you. Do you now acknowledge that there is a link between the game and these concussions that people have been getting, some of these brain injuries?

ROGER GOODELL: Well, Bob, that's why we're investing in the research, so that we can answer the question, what is the link? What causes some of the injuries that our players are still dealing with? And we take those issues very seriously.

MARK FAINARU-WADA: Though the league previously, through Greg Aiello, acknowledged a link, there's no more acknowledging a link exists. There's "The science is still emerging and we're really going to try and do long-term studies on this. And we're going to figure out whether there's a link."

ROGER GOODELL: We're going to let the medical individuals make those points. We're going to give them the money, advance that science. In the meantime, we have to do everything we can to advance the game and make sure it's safe.

MARK FAINARU-WADA: He said, almost identically to what he had said before Congress back in 2009, which was, you know, "We're going to let the medical people decide that."

NARRATOR: Almost two decades after the NFL founded its first scientific committee to research the issue, the league continues to insist the evidence of a link between CTE and football is unclear.

PETER KEATING, Reporter, ESPN: It sure looks like it was just a relentless and endless delaying action. Year after year after year, at crisis after crisis after crisis, the concussions committee and its members assured the public that the league was looking into this.

The league actually never got around to looking at it in any kind of valid way. We're talking in the year 2013. This committee was founded in 1994. Maybe there should be better evidence by now.

NARRATOR: As the concussion crisis deepened, the commissioner faced yet another challenge, a lawsuit brought by more than 4,500 retired players.

PETER KEATING: The threat to the NFL from this litigation was existential. The threat was that the league was going to have to pay out in the billions with a B, not millions with an M.

NARRATOR: About one third of NFL veterans, including some of the biggest former stars, claimed the NFL had fraudulently concealed the danger to their brains.

THOMAS GIRARDI, Players' Attorney: The main allegations here are—it's very simple. There was a very severe hazard that was present in professional football, and it was a little secret. The NFL knew it, but the players certainly didn't know it.

NARRATOR: On the other side, the NFL's lawyers.

LEGAL AIDE: OK, representing the National Football League will be Paul Clement. He'll be flanked by Anastasia Danias — she's from the National Football League — and also Beth Wilkinson from Paul Weiss —

NARRATOR: They insisted the league had done nothing wrong.

BETH WILKINSON, NFL's Attorney: Let's be clear. Let's be clear. We strong—we strongly deny those allegations that we withheld any information or misled the players. And if we have to defend this suit, as Paul was alluding to, we will do that and be able to make those factual allegations. But we absolutely deny those allegations.

NARRATOR: But away from the cameras, the two sides were engaged in tense court-

JA5454

ordered negotiations.

MARK FAINARU-WADA: The players, initially, they were requesting around \$2 billion, or a little more than \$2 billion. And what we've been told is the NFL was offering virtually nothing. They were offering "peanuts," as one person said.

NARRATOR: The players believed they had significant leverage, a threat to the NFL.

PETER KEATING: The threat was that the doctors and trainers, neuropsychologists, maybe owners, maybe commissioners and ex-commissioners, were going to have to testify under oath as to what they knew and when.

NEWSCASTER: —historic settlement today with the NFL—

NARRATOR: Then, with football season about to begin, a surprise settlement.

NEWSCASTER: —settlement between the National Football League and thousands of its former players.

NARRATOR: The league agreed to pay \$765 million to resolve the lawsuit.

ALAN SCHWARTZ, The New York Times: It appears as if it ties it up quite nicely. You know, the two sides figured out that that was fair, and they were OK with it. And so the image of the situation to most fans is that the NFL got taken to task for the concussion problem, OK?

NEWSCASTER: There is a proposed settlement in a huge concussion lawsuit—

NARRATOR: But the settlement left one big question unanswered.

MARK FAINARU-WADA: There's no admission whatsoever of guilt by the league. The league makes it very clear they're not admitting any guilt, that there's no acknowledgement of any causation between football and the possibility of long-term brain damage. And that was—you know, that was a prominent part of the settlement.

PETER KEATING: I don't think we needed a trial to know that the NFL conducted a lot of shoddy research. And it wasn't hypothetical. It wasn't a supposition. What the trial would have done was bring out that evidence. You didn't need the trial to know that there was something wrong there. But the details of how they went about it, that's what's going to stay locked away.

[www: Inside the settlement]

NARRATOR: One week later, the commissioner made the league's position clear.

ROGER GOODELL: [CBS "This Morning," September 4, 2013] There was no admission of guilt. There was no recognition that anything was caused by football.

NARRATOR: The league would not have to answer those tough questions about what they knew and when they knew it.

ROGER GOODELL: —that we've reached an agreement here that resolves these issues, and we'll move forward from there.

HARRY CARSON, Author, Captain For Life: I think everyone now has a better sense of what damage you can get from playing football. And I think the NFL has given everybody 765 million reasons why you don't want to play football.

ANNOUNCERS: Erenberg touchdown!

Touchdown Pittsburgh Steelers!

Listen to this crowd! They're on fire!

NARRATOR: For now, the future of the league and the game of football seem secure.

ANNOUNCER: Franco Harris is now at the 30. Big pileup!

NARRATOR: But fundamental questions remain about how the game will be played, and who will play it.

ANNOUNCER: It's still wild and woolly and I love 'em that way.

ANNOUNCER: You love 'em wild and woolly and you're seeing it now!

MARK FAINARU-WADA: You've got the most popular sport in America basically on notice. You've got the very real question being asked of whether the nature of playing the sport exposes you to brain damage and lots of science that suggests that it can.

ANNOUNCER: An awesome physical team were the Steelers today!

MARK FAINARU-WADA: And that raises all sorts of questions for guys who are playing in the league, guys who played in the league, moms, kids, all of us who love football. It's pretty scary. It's a big deal.

ANNOUNCER: And the future opponents are going to have some trouble!

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EXHIBIT 20

The New York Times

October 9, 2013

Partly by Shunning Documentary, ESPN Lifts It

By RICHARD SANDOMIR

In August, ESPN pulled its name and logo from “League of Denial,” a “Frontline” documentary about how the N.F.L. handled — or, more appropriately, mishandled — the concussion crisis among its players. ESPN’s decision came seven weeks before the documentary was scheduled to run and ended a 15-month collaboration with “Frontline” that had already produced nine separate reports.

At the time, ESPN said that it had decided to end the collaboration because it belatedly realized that it did not have editorial control over anything “Frontline” televised or posted online, including an online promotion that angered the league and ESPN.

But The New York Times reported that ESPN had backed out after being pressured by the N.F.L., its most important television partner.

By ending its agreement with “Frontline,” ESPN could not erase its influence on the two-hour documentary, which ran Tuesday on PBS stations. The film is based largely on the work of two of ESPN’s investigative reporters, Steve Fainaru and Mark Fainaru-Wada.

And the Fainaru brothers were the on-air reporters for an engrossing and disturbing telling of a nearly 20-year story about the league’s resistance to acknowledging the growing evidence of the link between concussions and progressive degenerative brain disease.

So while ESPN could strike its name from “League of Denial,” it could not make the brothers disappear.

ESPN’s pullout was a boon for “Frontline.” The attention paid to ESPN’s hasty decision made a lot of people aware of “League of Denial.” Had ESPN quietly accepted the collaboration ground rules with “Frontline” and told the N.F.L. that it would be a public relations error to pull out, many people might not have been alerted to the documentary.

“Frontline,” of course, wanted the connection to ESPN. It had spent 15 months working with ESPN and wanted to augment its audience with ESPN’s when it showed the documentary. But the breakup potentially jeopardized the possibility that ESPN would carry excerpts from

it on “SportsCenter” and “Outside the Lines” and on [ESPN.com](#). ESPN was always going to promote the Fainarus’ book, which is also called “League of Denial.” But hyping only the book might have had little effect on the documentary.

Raney Aronson-Rath, the deputy executive producer of “Frontline,” said she had been reassured after ESPN’s unexpected departure from the project that the sports channel would still try to show excerpts. There was, however, no certainty or clarity. “But clearly, considering the fact that they withdrew from the editorial collaboration, we had no idea what would happen in the end,” she wrote in an e-mail.

Then, about two weeks ago, Dwayne Bray, senior coordinating producer of ESPN’s news-gathering unit, called Aronson-Rath to resurrect the relationship. He wanted to work out a deal to carry excerpts, and he had the backing of John Skipper, ESPN’s president, to pursue one. “He felt it would be powerful to have them,” Aronson-Rath said in a telephone interview.

“It was a conversation about what would work best for them, and, in collaboration with the Fainarus, we chose the excerpts,” she said. “We had had such a productive relationship with Dwayne that we’re pleased this came through.”

Aronson-Rath said three clips were chosen: one for “SportsCenter” and two for “Outside the Lines.” They began to run last week. “Outside the Lines” has used excerpts several times. ABC News and the PBS program “NewsHour” have also showed clips.

Skipper told a somewhat different version: that ESPN had had every intention of running excerpts, even after it withdrew from the collaboration. “That was part of our original support for the Fainaru brothers,” he said.

He said it was possible that ESPN’s intentions had not been clearly conveyed to “Frontline” until Bray called Aronson-Rath.

After the abrupt end of the collaboration, she said, “you can understand why we had no idea what they would decide.”

The decision to show excerpts, after the flap caused by ESPN’s withdrawal from the project, apparently increased “League of Denial’s” audience. The documentary drew an average of 2.2 million viewers, according to overnight Nielsen figures, well above the program’s average of 1.5 million viewers. “Frontline” also had one of its heaviest days of traffic to its Web site.

For Skipper, one lesson of the flap over “League of Denial” is that he should have ended the collaboration a lot sooner.

"I wish I'd made the decision a year ago," he said. "I still think it was the right decision, while I understand that it opened us up for appropriate criticism."

He stood by his reasoning that ESPN should not have entered into a venture that did not allow it editorial control over everything. And, he added, no one at the N.F.L. has called to rebuke him for showing excerpts from the documentary.

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JA5460

EXHIBIT 21

Mass Tort Litigation Blog

Tuesday, November 18, 2014

The NFL Concussion Settlement: Class Action Exploitation

By Joe Tort

By Howard Erichson

Tomorrow in Philadelphia, lawyers for the NFL and lawyers for former football players will try to persuade Judge Anita Brody to approve their settlement of claims that the League concealed chronic risks of concussions and failed to protect players. The judge, the players, and the public should view the settlement with suspicion.

We have grown so accustomed to "settlement class actions" that we have lost sight of what is strange and troubling about them. Class actions serve an essential function in our legal system by empowering claimants in mass disputes, and I reject the knee-jerk criticisms of class actions that I hear too often. But when the class action tool is exploited by defendants to buy peace on the cheap, and when class members are harmed by the alignment of interests between defendants and class counsel, I feel the need to speak up.

Who reached this agreement with the NFL? Not the thousands of former football players. The deal was struck by lawyers who purported to represent the players but who had not actually gotten the go-ahead to litigate for the class. To litigate a class action, lawyers must get the class certified. But in this case, the lawyers negotiated their settlement before the court certified the class.

It makes sense that the NFL would want to do it this way. By negotiating before class certification, the NFL knew that the plaintiffs' lawyers lacked the leverage that comes with being able to say, "See you at trial." And it makes sense that the players' lawyers would go along. They stand to make \$112 million plus up to five percent of each award going forward. If these lawyers failed to reach agreement with the NFL, they risked being cut out if the League struck a deal with someone else.

In a "settlement class action" like the NFL deal, lawyers ask the court to certify the class for settlement only, as opposed to a standard class action that can be litigated or settled. This ought to be the first question people ask when they hear about a class action settlement: Was the class certified for litigation? If not, then class members are especially vulnerable to exploitation.

It is not an obscure problem. As I explain in *The Problem of Settlement Class Actions*, settlement class actions have become more common than standard class actions. And while good settlements exist, we see mischief too often. Three weeks ago, the Seventh Circuit heard arguments in *Pearson v. NBTY*, a settlement class action about false labeling for glucosamine supplements. Among numerous other problems, the lawyers' fees were more than double the amount actually paid to the class. The district court's opinion approving the settlement is disturbing, and Ted Frank's argument for the objectors is powerful. And in *Lane v. Facebook*, a settlement class action involving claims that Facebook illegally shared information about members' Internet activity, Facebook paid over \$2 million to the plaintiffs' lawyers, \$6.5 million to a foundation that Facebook would partly control, and zero to the class members. Facebook discontinued the challenged program but could reinstate it under a different name. Facebook wiped away its liability while the class members got nothing of value. Chief Justice Roberts was horrified.

Compared Cases 2012 and P2014PL 00113240525522 Filed 11/26/14 Page 63 of 101 Date
compensation, and for others it offers long-term insurance. Judge Brody initially rejected the settlement but then gave it preliminary approval after the NFL removed a cap on the fund. But the dynamic of settlement class actions should make us ask questions. The settlement rewards certain diagnoses (Alzheimer's, Parkinson's, ALS) over others (CTE). It pays for cognitive impairment but not mood disorders. The objectors make a strong argument that these items are crucial. The settlement imposes a registration requirement and other hurdles that objectors say are intended only to reduce claims. I can see why the deal has drawn so much fire and why Public Citizen sought to intervene.

The truth is, it is always hard to judge whether a class settlement is fair. A settlement, after all, is a compromise. There is no magic formula by which a football fan or a federal judge can evaluate whether the settlement is good enough. What we *can* ask, however, is whether the settlement resulted from a fair process, a negotiation on a level playing field. The answer is no.

The concern in every settlement class action is that lawyers may have struck the deal not because it was the best the class members could have gotten, but because it was the best the lawyers could get for themselves. If the settlement proves inadequate, then the lawyers get rich, the League gets off easy, and the football players – damaged forever – are left without the money they need to take care of themselves and their families for the rest of their lives.

There is, of course, something the judge can do about it. Reject this settlement, and on a proper motion, certify the class for litigation as well as settlement. Rest assured, there will be a better offer on the table. Although the judge would still face the difficult task of evaluating a class settlement and would still have to be on the lookout for abuse, at least she would know that the players weren't disempowered from the start.

http://lawprofessors.typepad.com/mass_tort_litigation/2014/11/the-nfl-concussion-settlement-and-class-action-exploitation.html

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EXHIBIT 22



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Page printed from: [National Law Journal](#)

Podium

Op-Ed: Concussion Settlement Is Deeply Flawed

Proposed deal between the NFL and former players lacks compensation for host of injuries.

Michael V. Kaplen and Shana De Caro, The National Law Journal

July 21, 2014

An analysis of the proposed National Football League settlement affecting about 20,000 retired players that U.S. District Judge Anita Brody preliminarily approved on July 7 exposes significant flaws. Many classes of players are not adequately represented, and most NFL players are all but ignored by the attorneys who negotiated the agreement. Certain, small and discrete groups are designated for compensation, but players experiencing physical, emotional and behavioral impairments remain excluded.

No specific amount was identified in the deal, but Brody previously rejected a \$675 million settlement between the parties as insufficient. This latest proposal purports to generously provide financial stability for players with traumatic brain injury, but a closer look reveals a systematic design to exclude most players from participation and to reduce payments to the small group who meet arbitrary criteria. It imposes unfair and illogical restrictions on the categories of compensable injuries and requires NFL participation for excessively long periods.

The settlement excludes many known conditions and creates arbitrary distinctions based upon years of service and age of the player at the time of onset. In addition, the class-representative attorneys have an inherent conflict in simultaneously representing players in different categories with differing injuries, unfairly favoring some of them with no rational basis.

A glaring, wide-ranging inadequacy is the complete omission of any player who has suffered physical, emotional and behavioral consequences across the entire spectrum of mild, moderate or severe brain injury. This proposal is limited to players who have demonstrable cognitive injuries from moderate or severe traumatic brain injury and excludes those suffering emotional and behavioral difficulties but not cognitively impaired.

The subgroup with behavioral and emotional symptoms of chronic traumatic encephalopathy (CTE) is also excluded from compensation. The families of former players with postmortem evidence of CTE who died from suicide, such as Junior Seau and Dave Duerson, would receive no benefits under this settlement if they died after preliminary approval was granted. Inexplicably omitted are traumatic epilepsy, seizure disorders, hormonal deficiencies and

JA5465

stroke, though well known to be caused by isolated or repeated head trauma.

Many retired players receive Medicaid and Medicare benefits or may be entitled because of football-related brain trauma. Settlement funds must be expended to satisfy these statutory liens for past traumatic brain injury benefits and additional funds segregated to satisfy Medicare's future interests (Medicare set-aside). Considering these limitations, the gross sum recovered may provide little or no financial benefit. Player compensation determined by years of play and age at time of symptom onset ignores the reality that the permanent consequences of brain injury can be sustained at any time in a professional career, from preseason forward. This settlement ignores players whose careers are terminated by preseason traumatic brain injury.

The baseline assessment program purportedly evaluates and provides benefits to players who meet its criteria. Neuropsychological testing, in isolation, disregards the physical, emotional and behavioral injuries historically recognized in postconcussive syndrome. Mood changes, depression, impulsivity and aggressive disorder are excluded. Persistent and debilitating headaches, dizziness and sleep disorders are excluded.

The baseline assessment program deliberately disregards prior neuropsychological testing and overlooks pre- and postinjury observations of family members, friends and associates all embodied within a meaningful diagnosis. The baseline assessment program embraces inappropriate measures of exaggeration, malingering and effort to deny valid claims. These "tests" purportedly distinguish the malingerer from one with legitimate brain damage, implicitly assuming that a test can establish this distinction.

This supposition disregards and dismisses fundamental, recognized characteristics of traumatic brain injury. The conclusion of malingering presupposes that a brain-injured person cannot fail the exam. Performance below recommended cutoffs is not the essential condition of "malingering."

For those few who meet the baseline assessment program criteria and are deemed to have sustained a qualifying neurocognitive impairment, benefits are limited to medical treatment and examination, counseling and pharmaceuticals. These ostensible benefits fail to provide most players with many required and valuable services. These players require home- and community-based services to help them live as independently as feasible.

Spouses of qualifying retired players are improperly and unfairly treated. The settlement deducts a percentage from the player's award and redistributes it to the spouse. No compensation is provided for spouses who abandon their own careers to care for their husbands.

The underpinnings of this lawsuit were the deliberate, long-standing NFL misrepresentations concerning the known health risks associated with concussions. This proposal changes nothing. The court has an obligation to protect all class members.

Any settlement that fails to should be rejected as fundamentally unfair and contrary to the best interests of the majority of class members.

Michael V. Kaplen and Shana De Caro are partners at De Caro & Kaplen in Pleasantville, N.Y. Kaplen teaches a course in traumatic brain injury at George Washington University Law School. De Caro is chairwoman-elect of the traumatic brain injury litigation group of the American

Association for Justice.

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EXHIBIT 23

San Diego Reader



- These brain-concussion lawsuits will stretch on until somebody invents brain-replacement surgery.
- [Sporting Box](#)

Settlement II: Concussion cases become a headache for NFL

1 0

By [Patrick Daugherty, July 9, 2014](#)

World Cup soccer fans, cheer up, the NFL preseason starts in 24 days. Since we have time to kill, the pre-preseason may be the perfect occasion for a heart-to-heart about — always a crowd favorite — brain

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concussions.

If you've read this far, you'll recall the original NFL concussion settlement — featuring a \$675 million payout, agreed to by retired players' lawyers and the NFL — was so unfair that a Philadelphia federal district court judge, Anita Brody, rejected it. Whoa.

You have this front page, coast-to-coast lawsuit, both sides agree to a resolution, but the resolution is so obviously bad, so obviously unfair, even the referee can't stomach it. Like nothing else, this explains how this lawsuit is about the NFL avoiding the discovery process and plaintiffs' attorneys getting paid (attorneys are due up to \$112.5 million within 60 days of settling).

So, settlement I is shelved. So, plaintiffs' lawyers and NFL lawyers have to cook up something else to sell to the judge. Concussion Settlement II was submitted to Judge Brody on June 25, 2014.

There won't be caps on how much money the NFL will spend, but *caps remain* on how much each retired player may receive for each covered medical condition. If the NFL actuaries are correct — and we don't know, since their work hasn't been shown to the public, but if they're right, the actual outlay of NFL money won't change. If they're wrong, the total payout might be more, might be less. In either case no player will receive more money than what was due in Settlement I.

I wrote about a preliminary Settlement I draft last September. "The money is distributed over a 20-year period. Half to be paid out in three years, the other half to be paid out over 17 years. The NFL is making \$10 billion in yearly revenue, projected to be \$25 billion by 2027. But, let's suppose the NFL's revenue stays flat at \$10 billion a year, and let's suppose there is zero inflation for the next two decades. Journalist David Tigabu, commenting on how much money the NFL will take in over the next 20 years, writes, "...the \$675 million figure being distributed to the players through this settlement amounts to .34% of the NFL's total projected revenue over this period.' Less than one-half of one percent."

The corporate media doesn't talk about one-half of one percent. It's too complex, takes a paragraph to explain; better say \$675 million and move on. Not remotely accurate, but it is easy.

Settlement I limited the NFL to ten appeals per year. Settlement II allows the NFL unlimited audits and appeals on players' claims. In other words, if the NFL wants to trim expenses, they could demand this proof or that form, say this wasn't filled out right and that wasn't dotted. They could wage a paper war until the beneficiary gives up or dies.

In Settlements I and II, the NFL admits no liability, doesn't have to answer a shit-storm blizzard of subpoenas about who knew what and when, won't have a generation of NFL executives, coaches, trainers, and doctors deposed or made to testify in court, won't have emails revealed, or dirty secrets exposed. Now that's worth one-half of one percent.

In Settlement II, the NFL must deposit \$120 million in a brain-damage award fund within six months of closing. After that, the league is only obliged to make deposits "as needed" to keep the fund at \$10 million for the first ten years. Only needs to keep the fund at \$5 million for the 11th through 50th year. At \$1 million from the 51st through 60th year, and \$250,000 though the 65th year. Suddenly, the only guaranteed money seems to be the initial \$120 million. That one-half of one percent just took a brutal hit.

Since retired players' attorneys are looking at a \$112.5 million payday within 60 days of settling, and the NFL is looking at a flood tide of brain-concussion lawsuits that will stretch on until somebody invents brain-replacement surgery, you can't find two sides who are more eager to settle.

Then there are the retired players. You have to do something about them. If the judge approves Settlement II, it will be sent to 18,000 plaintiffs and their beneficiaries. Retired players will vote to approve the settlement, opt out, or object to. How long will that take? No player will be paid until all appeals are exhausted.

Next up, 750 former NFL players are involved in a lawsuit, filed in federal court, alleging the NFL illegally and unethically supplied them with drugs designed to mask pain. If this keeps up, the NFL might have to move their payout needle to one percent.

EXHIBIT 24



NFL Critics Say Concussion Accord Ignores Broken Lives

By Sophia Pearson and Jef Feeley - Nov 19, 2014

Andy Miketa was known as the NFL's lightest center during his two-year career with the [Detroit](#) Lions in the 1950s. At 6-foot-2 and 210 pounds, Miketa used his speed and toughness to stymie defensive linemen who outweighed him by 75 pounds.

Sally Miketa Stern remembers her father's stories about the 1954 National Football League championship game between the Detroit Lions and the Cleveland Browns. That game and others took their toll, she recalls.

Miketa's mental deterioration after multiple concussions left him homeless and alone later in life, his daughter said in a letter to the judge who today will consider final approval of the league's \$765 million settlement with former players and their families. Stern's letter is one of more than 60 urging U.S. District Judge Anita Brody in Philadelphia to reject the settlement in its current form.

The letters describe as the legacy of repetitive hits on the gridiron a multitude of injuries such as gnawing headaches, hearing loss, blurred vision, explosive anger, debilitating paranoia and dementia. The settlement, they conclude, is simply not enough to compensate players and their families.

In the 1954 championship game, Miketa suffered a concussion while protecting Hall of Fame quarterback Bobby Layne. He returned to the Lions' offensive line, only to have his eye sockets smashed during the next play. Dizzy and nauseated, he returned to the field again and got a broken nose in the 56-10 drubbing by the Otto Graham-led Browns.

Gridiron Legacy

Miketa endured repeated concussions in the 1953 and 1954 seasons, laying the groundwork for future heartache, his daughter said. The Ohio native died in 2010 at the age of 80, after spending the last quarter-century of his life battling homelessness, subsisting on Social Security checks and "wandering around aimlessly, climbing into dumpsters," Stern wrote in her letter to Brody.

Although he managed to become a dentist after the NFL, the "best of his mind was destroyed by football," she said.

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"He died without any life insurance, without a cent to his name, owning nothing," Stern wrote. "I had to ask the NFL to pay for his cremation."

Objectors such as Stern argue the settlement falls especially short for those who have symptoms of chronic traumatic encephalopathy, or CTE, a brain disease diagnosed only after death. CTE was linked to the suicides of Pro Bowl linebacker Junior Seau in 2012 and Chicago Bears safety David Duerson in 2011.

'Advantageous Deal'

"Maybe in the back of everyone's mind is the perception that the NFL got off very easily in the proposed settlement, in comparison to the revenue the league and teams earn," said Mark Conrad, a law professor and director of the sports-business program at Fordham University.

"As of now I do think the NFL owners particularly got a very advantageous deal," he said.

About 5,000 players have sued the league seeking damages for head injuries. In July, Brody granted preliminary approval to a revised deal in which the league would pay at least \$675 million in cash to retirees suffering from a list of qualified injuries including Alzheimer's disease, Parkinson's disease and amyotrophic lateral sclerosis, known as ALS or Lou Gehrig's disease.

Medical monitoring and educational programs bring the total settlement to \$765 million. The league estimates it will have to pay out no more than \$900 million.

Players Approved

The deal, which was approved by 99 percent of the roughly 21,000 retired players in the class, will "spare thousands of retirees and their families the financial and emotional cost associated with years of litigation," the NFL said in papers filed ahead of the hearing.

"This settlement will provide the benefits we need to take care of our families and have the best quality of life we are able to have," Kevin Turner, a former fullback for the Philadelphia Eagles who now suffers from ALS, said in a statement. "The sooner the agreement is approved and its benefits begin to flow, the bigger the difference it will make in the lives of those who are hurting."

Chris Seeger, the lead plaintiffs' lawyer who helped negotiate the settlement, urged Brody to approve the deal as fair and reasonable while stressing the uncertainty of a court loss on the league's argument that the claims are preempted and barred by labor agreements with the players' union. Brody ordered the parties into mediation before ruling on that issue last year.

'Death Knell'

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About 17 percent of the class, or 3,600 players, are expected to have or develop compensable injuries covered by the deal, according to analyses done for lead plaintiffs' lawyers and the league and made public in September following a request by Bloomberg News. Of that number, the families of about 50 players who were diagnosed with CTE posthumously would be paid for those claims, according to the reports.

Dozens of players and their relatives have objected to the pact, saying it fails to address wrongful-death claims, it unfairly penalizes the league's oldest players and excludes from consideration seasons played in NFL Europe.

The most contentious objections are focused on the exclusion of ex-players suffering from early effects of CTE. The families of players who died from the brain disease before the settlement's July 7 preliminary approval date might receive as much as \$4 million each under the agreement. Because CTE is now confirmed only by autopsy, players living with symptoms stand to get nothing.

Egregious Exclusion

"If you are a former player existing in a living hell, bereft of memories and facing even more deterioration in the future, you and your family get nothing," said [Erik Gordon](#), a professor at the University of Michigan's business and law schools who teaches about class-action settlements. "But if you kill yourself, your family potentially has a claim for millions. It just sounds crazy to the average person."

The fact that CTE put football brain damage into the national spotlight makes the exclusion of living players with symptoms that much more egregious, Mitchell Toups, a lawyer in Beaumont, [Texas](#), said in court papers filed on behalf of objecting players.

The settlement's restrictions on CTE claims "are designed to save the NFL a substantial amount of money on the very disease giving rise to the litigation," Toups said in the filing.

Initially discovered in boxers in the 1920s, CTE results from repeated shaking of the brain. It involves the formation of abnormal protein tangles that hamper communication between cells and lead to cell death. Functions such as memory and anger-control can disappear and dementia and death can follow. [CTE symptoms](#) can mimic those of Alzheimer's, Parkinson's and ALS.

Brain Disease

Since 2005, CTE has been discovered in the brains of at least 76 deceased NFL players. Duerson, Seau

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and Andre Waters, a Philadelphia Eagles defensive back, all suffered from the neurodegenerative brain disease.

The late Pittsburgh Steelers players Mike Webster and Terry Long were also diagnosed with CTE. Webster died of heart disease at age 50 in 2002 after suffering from dementia. Long killed himself in 2005 at age 45 by drinking antifreeze.

In September, a study done by the Department of Veterans' Affairs brain depository in Bedford, [Massachusetts](#), found CTE in 76 of 79 former NFL players, PBS Frontline reported. An earlier study done in 2012 by the Boston University Center for the Study of Traumatic Encephalopathy, which maintains an ex-athletes brain bank, found the disease in 34 of 35 former NFL players examined.

Duerson's Suicide

Duerson, 50, killed himself in February 2011 with a gunshot to the chest after enduring intense headaches and deteriorating memory. He left a note asking that his brain go to the Boston University lab where it was determined he had CTE.

Researchers at the National Institutes of Health said last year that brain-tissue samples showed Seau had CTE. Seau's family sent his brain tissue to the NIH in July 2012, two months after he shot himself in the chest outside his home in Oceanside, California. His family has opted out of the litigation and will pursue a wrongful-death claim in state court, according to attorney Steven Strauss.

Two weeks before Seau's death, former Atlanta Falcons safety Ray Easterling shot himself at his ranch home in Richmond, [Virginia](#), after years of insomnia and depression spiraled into early stages of dementia in the early 2000s while still in his 50s.

Brain Bank

Robert Stern, a co-founder of the Boston brain bank, said in court papers submitted ahead of the hearing that players with early symptoms of CTE, those exhibiting changes in mood and behavior, aren't likely to be found impaired and eligible for compensation under the settlement's baseline medical monitoring program.

Had they both died after July 7, Seau and Duerson probably wouldn't have been found impaired under the settlement, Stern said.

"Their primary symptoms involved mood and behavioral disturbance, neither of which is compensable in the settlement," he said.

Kristine Yaffe, a University of [California](#) professor who led a Veterans Health Administration study on

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the link between traumatic brain injury, or TBI, and dementia, countered that a causal relationship between football and qualifying conditions under the settlement is tenuous at best. Even more so when it comes to CTE.

CTE Science

“The science regarding CTE is still in its infancy and the causes of CTE are unknown,” Yaffe said in court papers filed on behalf of the league. “There are significant challenges to establishing that, even on a broad population level, single or repetitive or mild TBIs resulting from NFL football are the cause -- or even one cause -- of an individual’s development of CTE.”

Mood and behavioral symptoms, such as depression, have many risk factors and could be completely unrelated to CTE, Yaffe said.

The CTE issue is a legitimate concern for players, although not as strong as the gamble of opting out of the deal altogether, Conrad said. About 220 players chose to take their chances with individual suits.

Player Gamble

“Time is not on the side of the victims because there are conditions that, if they’re there, will become more acute and more care will be needed,” he said. “There is a certain gamble on the part of a lot of players. If you opt out, you go it alone, and you’re going to have to have proof.”

Stern said in court papers that highly accurate clinically accepted methods to diagnose CTE during life are at the most 10 years away. A study being conducted by the center through a grant from the NIH seeks to develop biomarkers for detection and diagnosis of the disease.

Excluding compensation for CTE symptoms is premature, said Paul Anderson, a lawyer for ex-players who writes a blog on concussion litigation. “They’re attempting to wipe CTE from the lexicon completely and league history itself.”

The case is In re National Football Players’ Concussion Injury Litigation, 12-md-02323, U.S. District Court, Eastern District of [Pennsylvania](#) (Philadelphia).

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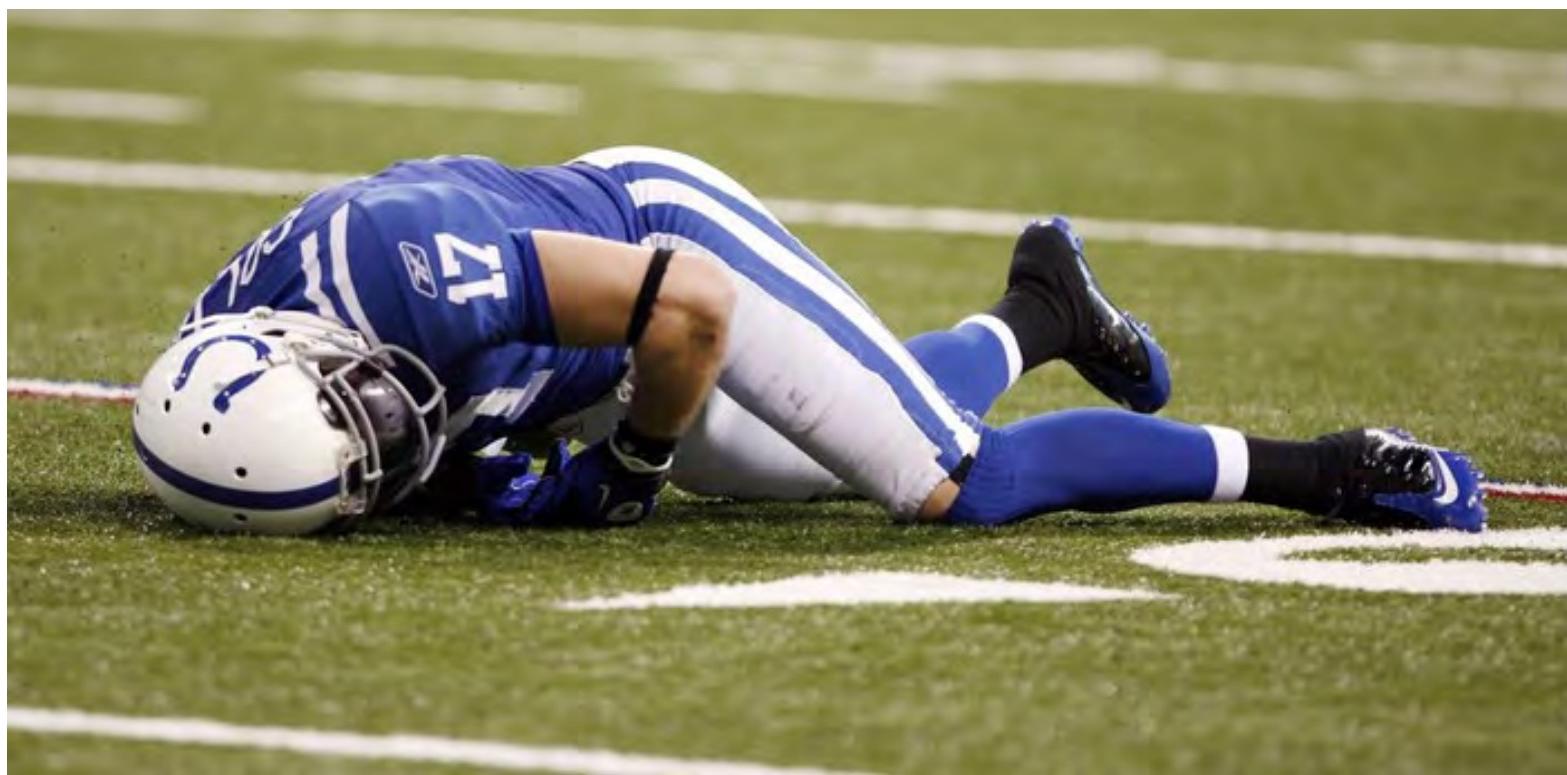
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EXHIBIT 25

BETA

THE

CHANNELS



THE NFL CONCUSSION SETTLEMENT IS PURE EVIL

October 28, 2014 | 8:25 AM Patrick Hruby (/contributor/patrick-hruby)



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(1)

Ken McClain figured the National Football League was preparing to screw his clients. Question was, just how badly?

A Kansas City-based attorney, McClain represents two dozen former professional football players in their mid-30s to 60s whom he says suffer from depression, impulsivity, and other life-altering symptoms of brain damage—damage presumably accumulated during years of on-the-job helmet-knocking. In theory, all of them ought to be covered by the proposed NFL concussion lawsuit settlement; a multimillion dollar class action agreement that promises to compensate ailing retirees and is moving toward final approval in federal court.

In practice, McClain discovered, the deal works a bit differently.

Over a two-month span and at a rough cost of \$10,000 per person, McClain says, he had his clients screened using the specific neurocognitive tests and diagnoses spelled out in the settlement. He then had those same former players evaluated by doctors at Boston University who specialize in chronic traumatic encephalopathy (CTE), football's industrial disease—a neurodegenerative condition that was found in the brain tissue of deceased retirees Junior Seau and Mike Webster and sits at the heart of both the suits against the league and the damning investigative journalism of the documentary *League of Denial*.

The results?

"Our worst fears were realized," McClain says. "We found our players had significant emotional and impulse control problems that according to [Boston University] are tied to head injury. All of our guys. And none of them qualify for awards under the settlement."

"It's a bogus deal. A fraudulent deal on its face, completely illusory, designed to pay very few people except the lawyers and the players in the most extreme [illness] category. All of these men saddled with neurological problems throughout their lifetimes are not the NFL's concern. The NFL's concern is containing risk, just as if they were [General Motors] and these players are faulty ignitions."

Of course, Case 18-2022-md-D2292 AP: D21103165255_2B_File2512/02714_Page_0052019
the NFL doesn't put things that way. Nor do the top lawyers representing the more than 4,500 former players suing the league. They call the settlement "extraordinary."
<http://www.latimes.com/sports/nfl/la-sp-nfl-settlement-20140708-story.html>) A deal that "reaffirms the [league's] commitment (<http://www.nfl.com/news/story/0ap2000000361552/article/revised-settlement-in-concussion-suit-reached-funds-uncapped>) to provide help to those retired players and their families who are in need." When federal judge Anita Brody gave the agreement preliminary approval last July, both sides touted it as being "uncapped," and with good reason: Brody had previously rejected a settlement paying out a maximum of \$675 million over 65 years. Now, the max has been removed. Every retiree who qualifies for an award will receive cash, regardless of the total cost to the NFL. Suffering men and their families won't—can't—be left high and dry.

"If you get sick, period, you still get paid," (<http://www.sportingnews.com/nfl/story/2014-07-14/nfl-concussions-lawsuit-cte-symptoms-eligible-settlement-tony-dorsett-wycheck-seeger>) says Chris Seeger, co-lead counsel for the players and one of a handful of attorneys who negotiated the deal with the league.

Er, not exactly.

Seeger is lying. Or at least bullshitting. As currently written, the settlement isn't designed to help hurting former players. To the contrary, it's designed to save the NFL as much money as possible, to the tune of billions of dollars of potential brain damage liability. If the deal goes through, many sick retirees won't get paid. Most of those who do will receive minuscule sums, hardly commensurate with their injuries, far from the hefty maximum awards—amyotrophic lateral sclerosis sufferers get \$5 million! Parkinson's victims get \$3.5 million! Everyone gets a car!—reported in the press and cited by the settlement's supporters. Only don't take my word for it. Or even McClain's.

Instead, ask the people who cut the deal in the first place.

Then, check the math and the fine print.



Demaryius Thomas after suffering a football injury. Photo by Mitch Stringer-USA TODAY Sports

According to documents filed in federal court, an actuary for the top plaintiff's lawyers—note: the people who are supposed to be negotiating the best possible deal for former players—predicts that while 5,900 of the approximately 21,000 retirees covered by the settlement will be sick enough with specific neurodegenerative ailments to receive compensation, only 3,600 of them will actually receive cash awards. As for the awards themselves, the same actuary estimates that the average former player will be 77 years old at the time the settlement's diagnostic tests qualify them for payment.

Why does that matter? Simple. The deal reduces payouts on a progressive, age-based scale: the older retirees are when they're deemed worthy of awards, the smaller those awards will be. For a 77-year-old former NFL player with amyotrophic lateral sclerosis (ALS), that means an 80 percent reduction from the maximum payout, from \$5 million to \$1 million; for the same player with Parkinson's, Alzheimer's, or debilitating dementia, that means reductions of 96 to 97 percent, from as much as \$3.5 million to as little as \$40,000.

Case#18-2012-md Document# 031132165255-28 Filed 05/22/18 Page# 29 of 52
Small wonder, then, that both the NFL's lawyers and Seeger have told Brody that they remain confident that total payments by the league over the lifetime of the settlement will not exceed the deal's original \$675 million cap. Small wonder, too, that Wisconsin-based brain injury attorney and advocate Gordon Johnson—who has actually read through the entire 163-page settlement and supplemental court filings—says the league will probably end up paying out even less, as little as \$250 million, all thanks to a deal he describes as a "hoodwinking."

"It looks like going into negotiations, the NFL authorized its attorneys to pay a billion dollars, or at least three quarters of a billion," says Johnson. "And then it became a contest among the lawyers for the league to see how they could define the terms of the settlement so that they didn't have to pay up."

It's a horrifying thought, but imagine you are the NFL. How do you win said cost-cutting contest, creating a settlement that only looks sufficient? Follow along...

Step 1: Ignore Your Industrial Disease

Picture a pair of clear plastic jars. Each contains the brain of an NFL retiree. Both brains have been examined by neuropathologists and diagnosed with CTE. Under a microscope, both brains show the same telltale tangles of tau protein that are the hallmark of the disease.

One retiree died between January 1, 2006 and July 7, 2014. Under the settlement's qualifying diagnoses of "Death with CTE," his family qualifies for an award of as much as \$4 million. The other retiree died outside of those dates. Under the same settlement, his family qualifies for nothing.

Sound fair?

CTE is largely why the settlement exists in the first place. Pittsburgh-based lawyer Jason Luckasevic, who filed the very first brain damage lawsuit against the NFL, calls the consolidated suits against the league "a CTE case." The actual class action complaint devotes nine paragraphs to the disease; by contrast, ALS, Alzheimer's, ~~and~~ Parkinson's merit two paragraphs—combined.

A 2013 National Institute for Occupational Safety and Health Study of nearly 8,500 NFL retirees who played at least five seasons between 1959 and 1988 recorded just 17 combined cases of the aforementioned three diseases among the former players surveyed. Meanwhile, 76 of the 79 deceased league retirees whose brains have been examined for CTE have been diagnosed with the condition.

And yet, the proposed settlement pays out for ALS, Alzheimer's, and Parkinson's disease going forward. It limits "Death with CTE" awards to the families of former players who died after January 1, 2006 and before July 7, 2014. Seeger argues that the cutoff is both appropriate and necessary for two related reasons: 1) As of now, CTE can only be definitively diagnosed via autopsy, and the settlement is designed to put cash in the hands of living, suffering retirees; 2) said retirees with CTE will be able to qualify for the settlement's generalized "neurocognitive impairment" awards, which are as high as \$3 million.

"I think people got really hung up on CTE, but, you know, this is all about symptoms," Seeger said during a CBS Sports radio interview (<http://www.sportsonearth.com/article/85045740/nfl-concussion-settlement-cuts-cte-coverage-short-patrick-hruby>) this summer. "If you're sick, and your activities of daily living are being interfered with, you can't function, you're going to get paid whether or not you have CTE."

This makes sense. Unless, of course, you know the first thing about the science of the disease. To qualify for the aforementioned neurocognitive impairment awards, retirees must undergo and perform poorly on a battery of neuropsychological tests that measure cognitive decline, which is measured using symptoms like memory lapses and executive dysfunction. Problem is, CTE patients often suffer from mood and behavior disorders: emotional explosiveness, impulsive behavior, poor judgement, outbursts of violence, (<http://www.hbo.com/video/video.html/?autoplay=true&vid=1396254&filter=real-sports-with-bryant-gumbel&view=null>) depression, and hopelessness. Think Seau's reported gambling, drinking, and relationship woes (http://espn.go.com/nfl/story/_/id/9410051/a-year-later-one-junior-seau-close-friends-comes-forward-recount-version-descent) before his suicide via gunshot wound to the chest, or Dave Duerson assaulting his wife, getting divorced, and watching his business empire implode

the chest.

Last year, Boston University CTE researcher Robert Stern and other scientists published a detailed study (<http://www.bu.edu/cte/files/2013/09/CTE-Neurology-2013-Stern-1122-9.pdf>) of 36 adult males who had CTE. Thirty-three suffered symptoms while alive. Twenty-nine played football. As I've written before, (<http://www.sportsonearth.com/article/85045740/nfl-concussion-settlement-cuts-cte-coverage-short-patrick-hruby>) the men fell into two distinct groups. One group, 11 men, first suffered from cognitive symptoms. They tended to live longer, and their symptoms tended to show up later in life, typically in their late 50s. By contrast, the 22 men in the second group first suffered from mood and behavior issues. They generally died younger, and their symptoms appeared earlier.

Mood and behavior disorders are a sign of brain damage. They absolutely interfere with your daily life, with having a family, or holding down a job. Only the settlement doesn't compensate players suffering from those symptoms. It doesn't even screen for them, something McClain's clients learned the hard way. If the deal goes through, the lone cold hope for them and all CTE-afflicted retirees who fall into Stern's second group—the bigger group—is to live and suffer long enough to develop cognitive problems. Then, and only then, will they possibly qualify for cash awards.

Of course, those same awards will be subject to age-based reductions.



Jason Campbell after suffering a football injury. Photo by Kirby Lee-USA TODAY Sports

If the above sounds like it was purposefully engineered by NFL lawyers to both save money and perpetuate the ongoing lie that CTE doesn't really exist.

(http://www.nytimes.com/2013/03/28/sports/football/doctor-for-nfl-says-study-overstates-effects-of-cte.html?pagewanted=all&_r=0) then you're starting to see how the game is played. After all, the league certainly is aware of Stern's study. Moreover, the NFL has known about CTE's mood and behavioral symptoms since at least 2009, when neuropathologist Dr. Ann McKee—an expert on the disease—met with league doctors and a group of independent researchers at NFL headquarters in New York City.

In a transcript of the meeting obtained by VICE Sports, McKee says the following:

"... personality and behavior changes are usually prominent and are seen in about two-thirds [of CTE patients]. Aggressive or violent behaviors are most common, followed by confusion. There's dysphoria, meaning depression or mania. Most of them are depressed but some of them have sort

Case 18-2023-md Document 2020-AP-031102165855-2B Page 2692/2714 Page 98/952019
of a bipolar look? They have alternating euphoria and depression. Many of them are irritable. A lot of them have poor insight or judgment, agitation, and some of the things that are less frequently seen are apathy and hypersexuality..."

Later, McKee discusses a CTE-afflicted boxer who retired at age 22 and was misdiagnosed with Alzheimer's disease in his 70s. Someone else at the meeting asks: was the boxer okay until then?

McKee responds:

"He was not okay. He would get disoriented when he went traveling and his wife called him punch drunk, but he stayed more or less stable until his 70's, when he started deteriorating more. It's a slowly progressive disease. Sometimes it smolders for years."

As for only being able to diagnose CTE after death? In September, researchers at Mount Sinai Hospital in New York City announced that an experimental brain imaging technique allowed them to identify (<http://www.cbsnews.com/news/new-test-to-shed-light-on-football-players-brain-injuries-cte-dementia/>) the disease in the brain in former New York Jets lineman Dave Herman—who played in the 1969 Super Bowl and happens to still be alive. Stern believes a verified, Food and Drug Administration-approved test for the disease will be available within the next decade, probably sooner. So how does the settlement account for future scientific advances?

By foreclosing on them. The deal specifically prohibits the NFL and the players' top lawyers from meeting more than once every decade to discuss possible changes to the tests used to determine brain damage, with each side holding a veto. (If the league doesn't like the Mount Sinai test, for instance, it simply can refuse to incorporate it.) Moreover, the actual diagnoses that qualify retirees for money can "in no event" be modified, which means there will never be a "Life with CTE" award, no matter what researchers learn over the next 65 years about identifying and treating the disease.

Again, the NFL knows what it's doing.

Case#18-2012-md-D0298-AB; D0311320165255-2Ba; Filed 02/07/14; Page 29 of 52; Date Filed 02/07/14
How much is the league saving through a settlement that eliminates and/or deeply discounts future CTE cases? The answer depends on how you crunch the numbers. Start with how many former players can reasonably be expected to develop the disease. No one knows for sure. But we can make a conservative, reasonably informed guess.

Between 2006 and the middle of last year, 1,128 former NFL players died. Fifty-two of the tested retirees—4.6 percent—were diagnosed with CTE. Apply that rate to the 19,400 living retirees covered by the settlement, and you end up with approximately 892 future cases.

For an even more conservative number, assume that the settlement had no Death with CTE cutoff date, and instead paid for future cases. Court documents filed by top player lawyers identify 46 CTE cases among 1,700 deceased retirees, which equals a disease rate of 2.7 percent. Apply that number to the same 19,400 living former player pool, and you get 524 future cases.

In court documents, the NFL estimates that Death with CTE cases will pay out \$1.44 million per player after accounting for age and other built-in settlement discounts. Multiply that number by our 524 still-to-come cases, and you end up with roughly \$755 million the league will keep in its coffers—a windfall larger than the total sum it expects to pay out under the current settlement.

If asbestos companies could write mesothelioma out of their settlements, they'd save an awful lot of money, too.

Step 2: Define Away Other Types of Brain Damage

Last week, former NFL quarterback Kevin Kolb wrote about retiring from the league at age 29 (<http://mmqb.si.com/2014/10/23/kevin-kolb-concussions-mexico-hurricane/>) because of concussions and about the brain damage symptoms he continues to suffer:

"...some symptoms are impossible to ignore. The ringing is like someone shooting a shotgun right next to my ear, every second of every day. It doesn't go away."

The sensitivity to light also has a profound impact. I'll be in a business meeting indoors and have to politely ask to put on my sunglasses before the headaches and double vision start..."

Neither of those problems is covered by the settlement. Nor are chronic headaches, numbness, burning, tingling, attention disorders, sleep disorders, loss of sense of smell and taste, balance problems, and other life-altering symptoms of brain damage. While people who suffer a single traumatic brain injury have a 150 percent greater risk of developing epilepsy than those who don't, seizures aren't part of the deal. Similarly, pituitary dysfunction doesn't qualify—even though (a) brain injury increases the risk of a problem that can result in fatigue, mood and cognition problems, and hardening of the arteries; (b) a recent study of 68 retired playersfound significant hormonal abnormalities (<http://www.ncbi.nlm.nih.gov/pubmed/24552537>) in 25 percent (16) of them.



Kevin Kolb after suffering a football injury. Photo by Mark J. Rebilas-USA TODAY Sports

Randy Benson is a neurologist and clinician at the Michigan-based nonprofit Center for Neurological Studies. He once testified before the House Judiciary Committee about brain injuries in football, and has studied and treated dozens of former NFL players, some sent to him by lawyers suing the league over concussions. "I get a checklist," Benson says. "Do they have ALS? Do they have Alzheimer's? The answer is, the bulk of the guys I see don't have that stuff. But what they do have is neurological impairment—we can see it with imaging—and they're in a bad way psychologically because of their brain injuries. These guys can't earn a living any more. They don't have a lot of money left. They end up alienating and isolating themselves."

Based on experience, Benson suspects damage to the pituitary gland—a pea-sized gland that sits at the base of the brain and secretes hormones that regulate many bodily functions—is common among the group. "We know with non-sports brain injuries the rate of pituitary deficiency is about a third of population," he says. "You can imagine people exposed to hits day in and out are really at risk. And those deficiencies can have pretty devastating consequences to people from the standpoint of psychological health."

The good news? Some of the same deficiencies are treatable. Working carefully with an endocrinologist, Benson has prescribed hormones to many brain injury patients, including a retired NFL lineman who came to Benson's clinic from a psychiatric ward, depressed and wanting to take his own life. "He is not suicidal anymore," Benson says. "He went home and hasn't felt this good in years."

The retired lineman wouldn't be helped by the settlement. Nor will Kolb. Again, how much is the league saving by pretending that certain types of brain damage don't matter, and that only severe neurodegenerative diseases saddle former players with pain, suffering, and medical costs? Impossible to say, but consider this: according to the Brain Injury Association of America (BIAA), human growth hormone and other drugs given to treat pituitary dysfunction can cost \$15,000-\$20,000 a year. For one person. For life. If a quarter of living retired players (4,850) have pituitary damage and need an average of, say, 30 years of treatment costing \$17,500 annually, that's another \$2.5 billion. Of course the NFL would rather not fork it over.

Case#18-2022-md-D2020-AB : D031103165855_2Ba File#2732/02714 Page#085/2019
Let's say you're a retired player who does qualify for settlement compensation. As mentioned earlier, your maximum possible award is subject to reductions based on age and the amount of time you played in NFL. The older you are at the time of a qualifying diagnoses and the fewer credited professional seasons you have, the smaller your payout.

On paper, this makes a kind of rough sense—players who had longer careers were exposed to more head injury risk, and cognitive ailments are more common among older people, regardless of having played in the league. In a memo filed with Brody, however, the BIAA argues three key points:

- 1) A single concussion can result in permanent brain damage.
- 2) Multiple concussions sustained over a single season or a short period of time can be more harmful than those sustained over a long career.
- 3) As a result, "the nature and extent of the impairment - not the number of seasons played - should be the determining factor in any monetary award."

University of Maryland health policy professor Eleanor Perfetto has a related concern with the settlement, which she shared with me (<http://www.sportsonearth.com/article/85045740/nfl-concussion-settlement-cuts-cte-coverage-short-patrick-hruby>) last summer. Her husband, NFL veteran Ralph Wenzel, died in 2012 at age 69 and was posthumously diagnosed with Alzheimer's and CTE. He originally was diagnosed with dementia in 1999, and began experiencing memory loss five years earlier.

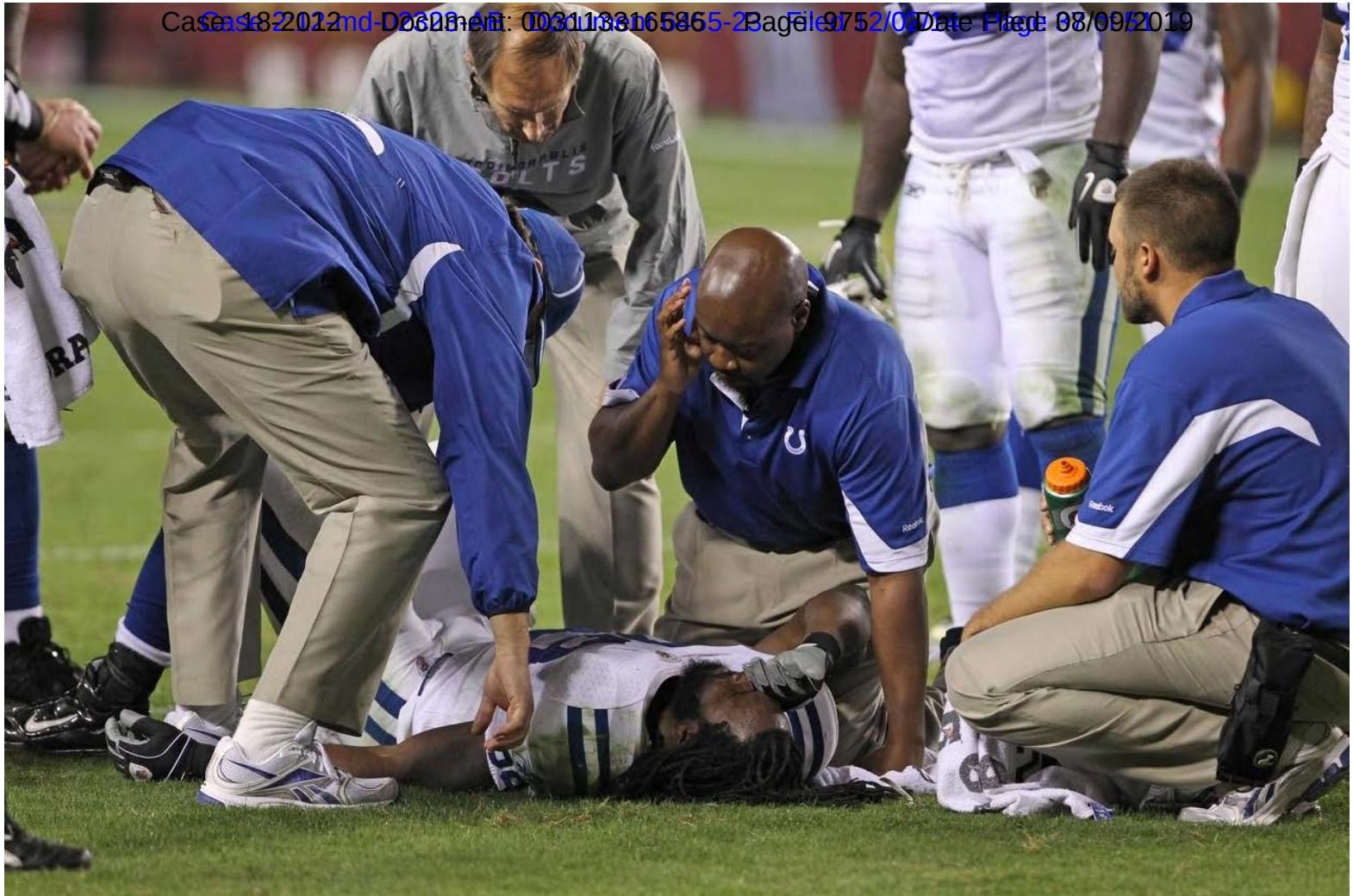
"With many of the older [NFL retirees], the date of their formal diagnoses is probably many years after they became sick," Perfetto told me. "So, like Ralph, maybe they had symptoms for five or 10 years before a formal diagnosis. And one of the reasons they didn't realize they needed to get checked out, or did get checked out but doctors couldn't figure out what was wrong with them, was all of the efforts the NFL made to smokescreen that this problem didn't exist."

Perfetto says her attorney told her that her husband is due a \$1.4 million payout for his postmortem diagnosis of CTE, based on his official dementia diagnosis at age 56. Had Wenzel instead been diagnosed in 1994, his award would have been closer to \$3 million.

"This is the one thing that bothers me a lot," Perfetto told me. "The NFL has actually managed to reward themselves for their deceit."

Also saving the league money? A series of settlement eligibility hoops that act as a kind of bureaucratic poll tax for brain-damaged retirees. If former players fail to register with a claims administrator within 180 days of a class notice being distributed following final settlement approval, they'll be denied awards. The same holds true for retirees over age 43 who fail to undergo baseline neurological exams within two years, and for younger former players who fail to do the same by their 45th birthday or the 10th year of the baseline program, whichever comes first. Now, imagine that you're a homeless retiree like Terry Tautolo, (<http://www.cbsnews.com/news/former-nfl-player-tackles-homelessness-after-living-under-la-freeway/>) or living in a dementia ward (<http://www.washingtonpost.com/wp-dyn/content/article/2007/03/15/AR2007031501929.html>) like Willie Wood. Are deadlines and paperwork really your forte?

(Speaking of paperwork, the settlement also requires all former players to produce "objective evidence beyond [a] sworn statement" of NFL employment and participation in more than one eligible season or have their awards reduced by 80 percent—even though the league keeps historical records of its own players. Do they want retirees to produce old copies of Madden NFL? Dog-eared football cards? As far as obvious cost-cutting measures go, this would be funny if it wasn't so transparent.)



Joseph Addai after suffering a football injury. Photo by Mitch Stringer-USA TODAY Sports

To receive a qualifying diagnoses—and with it, cash—former players have to be examined by doctors who have been approved by both the top players' lawyers and the NFL. Those same retirees have to pay for their travel and exams, no matter how poor or sick they happen to be. The league can appeal an unlimited number of awards per year at no cost; by contrast, former players have to pay a \$1,000 fee to appeal denied claims, and are limited to submitting just five pages of supporting evidence. "You can't do that in five pages," says Johnson, the brain injury lawyer. "I'm in the middle of a relatively straightforward mild brain injury case right now—I have to persuade a mediator—and those documents could fit into a banker's box. I have 80 pages summarizing 500 pages."

Further, Johnson says that the neuropsychological tests used by the settlement to determine impairment are both flawed and insufficient, and figure to disqualify deserving, brain-damaged NFL retirees. Stern, the Boston University CTE and neurodegenerative disease researcher, agrees. For JA5493

payout purposes, the settlement places former players into three neurocognitive impairment buckets: Level 1, Level 1.5, and Level 2. Only the latter two groups receive cash awards. In an affidavit filed in support of an objection to the settlement, Stern states that:

"...the algorithm used in the Settlement to translate test performance into compensable Neurocognitive Impairment categories is not one that is used in any known or published set of criteria for the determination of dementia, and utilizes a threshold of impairment that would exclude many [retired players] with dementia ... the criteria used in the Settlement would require that [retired players'] test performance be even more impaired than what is often seen in well-diagnosed cases of moderate stage dementia..."

To illustrate, Stern notes that under the settlement's testing and diagnostic criteria, two retirees of the same age and same number of credited NFL seasons could score exactly the same on a series of memory and intellectual functioning tests with the exception of a single word pronunciation exam—an exam stacked against people with dysarthria, a speech impediment that affects 10 to 12 percent of people who have suffered brain injuries—and as a result, one player would qualify for Level 1.5 impairment while the other would not. Never mind that both retirees, Stern writes, would be "so severely impaired in several areas of cognitive functioning that they would require assistance in many activities of daily living."

To weed out people who are attempting to fake brain injuries, neuropsychological testers use a concept called "malingering." Over a series of exams, sometimes lasting as long as five hours, patients are expected to give a consistent, emotionally-neutral effort—if they don't, there's a good chance they'll be labeled as frauds. Johnson says NFL retirees run a high risk of earning the same designation, even if they're truly sick. "This is a group of people who are emotional wrecks," he says. "And they're in pain. Pain makes you moody, makes you irritable. Most of these guys are probably too sore to sit in the same chair for five hours.

"If I were a defense neuropsychiatrist, my goal would be to piss off one of these guys during the exam and then say he's malingering. Not that the doctors will have to be that dishonest. People getting to this level of senility won't test well, anyway. Now add in the personality of someone who

Case#18-2012-md Document# 00311231658552 Date 07/2/2014 Page 98/995 2019
has played pro football, who has progressing CTE, who is in pain—it's all going to work together to come out badly."

Step 4: Ding 'Em With Demographics

Retired NFL lineman Craig Heimburer is 37 years old. A fringe pro, he played for five league teams over a four-season span, spent much of his career on preseason or practice squads, and appeared in 15 games for the Rhein Fire of NFL Europe. Heimburer suffered at least three concussions that he played through, including one with the Fire that caused memory loss and vomiting. In court papers, he claims that he now suffers from "personality changes, cognitive impairment," and pituitary damage, and that it's "virtually certain" he has CTE.

Under the terms of the settlement, however, any award Heimburer qualifies for will be reduced by as much as 60 percent. The reason? Time spent in NFL Europe doesn't count toward the deal's "eligible seasons," even though players across the Atlantic were still getting hit in the head while working for the league, and even though injured players were often flown back to the United States for surgery and rehabilitation. Given that approximately 3,500 retirees spent some or all of their careers overseas, that's likely millions more dollars that will remain in the league's hands for no good reason.

But wait. It gets worse.

All former players who suffer a single stroke or non-football-related traumatic brain injury—for instance, a concussion during a car accident—are subject to 75 percent award reductions. Does this make scientific sense? Not really. There's no way to determine that a stroke or slip-and-fall on an ice rink has caused three-quarters of the brain damage suffered by someone who has spent years bashing helmets on a football field. Nevertheless, NFL actuaries expect 4.5 percent of league retirees to suffer strokes, which means it also expects at least 162 settlement award recipients to forfeit three-quarters of their cash.

Case#18-22022-md-D22024 AP: D201120165855-23a File#782/02714 Page: 08/095/2019
Oh, and about that 4.5 percent figure: It's likely to be higher. After all, concussions increase the risk of stroke. So does using Toradol, a painkiller league doctors spent two decades administering to players. Moreover, obesity and large body size make strokes more likely, and black people are 1.3 times more likely to suffer strokes than other races.

In other words, the settlement isn't just parsimonious. The case could be made that it's structurally racist.

Step 5: Sweeten the Deal

A few weeks ago, lead player lawyer Seeger admitted to ESPN (http://espn.go.com/espn/otl/story/_/id/11693012/opposition-nfl-concussion-settlement-falls-apart-deadline-looms) that he "couldn't get the NFL to pay on every single set of injuries." True enough. And perfectly fair. But left undiscussed? Just how hard he and others negotiating on behalf of league retirees tried to get those same players paid at all.

Fact: Seeger and the other top player lawyers did not subject the NFL to discovery, nor did they take a single deposition to test the strength of their claims.

Fact: They reportedly engaged in only twelve days of mediation with the league before producing the initial settlement, a deal that is almost identical to the one awaiting final judicial approval.

Fact: The NFL has agreed to pay Seeger and a handful of other lawyers a separate \$112.5 million fee within 60 days of final approval, in addition to their individual client fees and a provision in the deal that allows them to petition the court for five percent of every settlement award going forward.

Did the league buy itself a favorable settlement for less money than it costs to buy 15 minutes of television ad time (<http://admeter.usatoday.com/story/sports/ad-meter/super-bowl/2014/01/20/ad-meter-story-super-bowl-ad-costs/4476441/>) during the Super Bowl? Not necessarily. Were the top player lawyers incentivized to fight tooth and nail for the best deal possible? Not in the least.

"The way the class counsels fees are structured, they don't pay the price down the road for this having turned out badly," Johnson says. "Wouldn't it have been a lot fairer to make their fee based on contingency, like one-third of what gets paid out in the future? They could still get to \$112 million, but I bet the qualifying diagnoses would be a lot different. They would have wanted players to get paid as soon as possible, not when they are 77 years old."



Trent Edwards after suffering a football injury. Photo by The Star-Ledger-USA TODAY Sports

Earlier this month, Debra Pyka wrote a letter to Brody.

(<https://www.scribd.com/doc/242658109/Letter-to-Judge-Anita-Brody-from-Debra-Pyka>) the federal judge overseeing the settlement. Pyka's son, Joseph, committed suicide at age 25. He played Pop Warner and high school football. He never played in college or the NFL. After his death, he was diagnosed with CTE. (<http://www.sportslegacy.org/research/legacy-donors/joseph-chernach/>)

The settlement, Pyka wrote, isn't just unfair to former players. It's unfair to mothers like herself:

...to this date the NFL has not made the research re: head trauma and concussions public ... I am furious with the NFL for keeping this research from the public. The NFL sponsors these young kids in Pop Warner through high school. I, and every parent along with the players, have a right to know of the dangers of playing football along with the brain diseases and brain trauma our children could possibly suffer in the future.

I do not know whether you are married or have children, but I'm sure you can relate to my pain and suffering. Try to imagine what life would be like without your child or spouse. Imagine watching them suffer from a brain disease or head trauma due to the negligence of an organization to fail to release information to prevent the suffering and death of many. Had the research been made public many years ago, these tragedies could have been prevented. I look forward to the day that those who knew of the dangers and let people suffer and die will be banned from the NFL and prosecuted..."

The league is not settling out of the goodness of its corporate heart, or because it truly cares about its brain-damaged former employees. The league is settling out of fear. Fear of liability. Fear of accountability. Fear of Pkya's question, the same one haunting McClain's clients, 24 of whom have opted out of the deal to pursue their case in state court: What did the NFL know, and when did it know it?

For a price that will likely be significantly lower than the \$1.17 billion value of the average team. (<http://www.forbes.com/sites/kurtbadenhausen/2013/08/14/nfl-stadiums-by-the-numbers/>) the league will never have to answer. So maybe Seeger is right. Maybe the proposed settlement truly is extraordinary. After all, the NFL isn't just buying silence. It's buying it on the cheap.

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Tags: nfl (/topic/nfl), football (/topic/football), concussions (/topic/concussions), brain trauma (/topic/brain-trauma), settlement (/topic/settlement), lawsuit (/topic/lawsuit), kevin kolb (/topic/kevin-kolb), dave duerson (/topic/dave-duerson), junior seau (/topic/junior-seau), dave herman (/topic/dave-herman), mike webster (/topic/mike-webster), als (/topic/als), parkinson's (/topic/parkinson39s), alzheimer's (/topic/alzheimer39s), cte (/topic/cte)

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The NFL Dodges on Brain Injuries

By Patrick Hruby

As the National Football League season kicks off, the sport's most significant contest isn't happening on the field. Rather, it's taking place in federal court, where a group of former players has challenged the proposed settlement of a class-action brain damage lawsuit filed against the league. Whether you're a diehard fan or utterly indifferent to football's charms, a [practicing neuropathologist](#) or someone who can't distinguish a concussion from a toothache, you might want to pay attention. Because the outcome of the legal battle won't just affect NFL owners and retirees.

To the contrary, the concussion settlement is a matter of public health—and potentially, significant public cost.

Related Story



[Why Football Must Get Safer](#)

A quick review of the basics: More than 4,500 retirees have sued the league, alleging that the NFL downplayed, dismissed, and covered up the [long-term neurological harm](#) associated with football-induced concussions and hits to the head—allegations detailed in “[League of Denial](#)” and [elsewhere](#)—thereby placing players at increased and unnecessary risk. While denying any wrongdoing, the league nevertheless has moved to settle the case, tentatively agreeing to fund an award program that would diagnose and compensate brain-damaged ex-players for the next 65 years, in exchange for virtual immunity from future litigation and Big Tobacco-style discovery of [what the NFL knew and when it knew it](#).

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So far, so good, right? America's favorite league, it seems, takes care of its own. Are you ready for some football? Not quite. While federal judge Anita Brody has [given the deal a preliminary go-ahead](#), a group of seven former players including Super Bowl winners Alan Faneca and Sean Morey is [attempting to appeal the settlement](#) before it can receive final approval from Brody later this year. Essentially, they're arguing that many retirees were inadequately represented during settlement negotiations.

A closer look at their objections and at the proposed settlement reveals the league trying to shirk full responsibility for the public health crisis it caused, maintaining a murky status quo of public equivocation and half-denial.

* * *

It sounds like a lot of money: Under the terms of the deal, former players will receive up to \$3 million for a dementia diagnosis; \$3.5 million for Alzheimer's and Parkinson's disease; \$4 million for death with chronic traumatic encephalopathy (CTE); and \$5 million for amyotrophic lateral sclerosis (ALS).

But those amounts are maximums. The actual awards are subject to a series of reductions and offsets. Former players with fewer than five credited years of NFL experience will see their awards reduced, some by more than half. The same holds true for retirees over age 45—the older players are when diagnosed with one of the above diseases, the less money they'll receive. And all of that comes before legal fees. Earlier this year, ESPN's Lester Munson [calculated that](#) a player who faced dementia after age 60 might end up collecting around \$375,000 after costs.

Other loopholes and reductions verge on absurd. While the settlement forbids former NFL Europe players from suing the league, it does not credit their overseas seasons toward award calculations—never mind that getting hit in the head wearing a London Monarchs helmet is biologically the same as getting hit in the head while playing for the Jacksonville Jaguars. Similarly, retirees who have suffered a single non-football-related traumatic brain injury or stroke will have their awards reduced by 75 percent, even though there's no scientific reason to assume that a concussion sustained in a post-career car crash would account for three-quarters of a former player's cognitive or neurobehavioral impairment, and even though NFL team doctors may have increased many former players' risk of stroke by [administering the painkilling drug Toradol in a manner contrary to Food and Drug Administration warning label guidelines](#) for roughly two decades.

Also note: Current and future NFL players are not eligible for cash awards, regardless of their neurological afflictions. The same holds true for players who have retired since the settlement received preliminary approval on July 7—including 27-year-old Seattle Seahawks receiver Syndey Rice, who walked away from football on July 23 due to concussions.

As for sick retirees who are covered, actually receiving money won't be easy. Not when the proposed deal's diagnosis and claims system features a number of hurdles that could trip up brain-damaged applicants, some of them already [struggling mightily with everyday life](#), others in assisted care or [indigent](#). Consider:

Retirees unable to register within 180 days of a supplemental settlement notice being distributed are ineligible for awards. So are former players over age 43 who fail to get a required neurocognitive exam within two years. These deadlines might seem reasonable—but could prove problematic for cognitively

challenged retirees who have a hard time with paperwork and punctuality.

The required exams—which are paid for by the settlement fund—are not sufficient to diagnose Alzheimer's, Parkinson's, or ALS. Former players who worry they may have those conditions will have to pay for additional testing themselves.

While the NFL can make unlimited appeals of award claims free of charge, retirees must pay a \$1,000 fee to contest those appeals.

Perhaps the best illustration of the settlement's limitations involves CTE, the neurodegenerative disease at the heart of League of Denial, long associated with boxing, first linked to football through an [autopsy of Hall of Famer Mike Webster's brain](#) and since implicated in the suicide deaths of Junior Seau, Dave Duerson, [Ray Easterling](#), and others. A 2013 National Institute for Occupational Safety and Health study of nearly 3,500 NFL retirees who played at least five seasons between 1959 and 1988 recorded 17 combined cases of ALS, Alzheimer's, or Parkinson's. Meanwhile, 33 of the 34 deceased league players in a 2010 study were diagnosed with CTE, a finding that left neuropathologist Ann McKee to wonder whether "every single football player doesn't have" the condition.

Given CTE's public prominence and potential prevalence, you might expect the settlement to generously compensate players who develop it. But only the families of NFL retirees who died between January 1, 2006, and June 7, 2014, and were subsequently diagnosed with the disease are eligible for "Death with CTE" payouts. Died on June 8? Still alive to read this? Tough break. Your family gets nothing, no matter how [riddled with destructive tau protein slices of your brain appear to be during posthumous examination](#).

Chris Seeger, the top lawyer for the retired players during settlement negotiations, argues that the CTE cutoff date was necessary for two reasons: (a) the disease currently can only be diagnosed after death; (b) the settlement is designed to help former players while they're still alive. If retirees suffer CTE symptoms, he insists, they will be covered by the agreement's dementia awards.

This is half-true at best. Some former players with CTE likely will be covered, albeit with reduced awards. Others will be shut out entirely. How so? According to [a study of 36 adult males—29 of them retired football players—diagnosed with CTE](#), the disease presents in two distinct ways, both consistent with case reports of former boxers. Some victims suffer first from the same sort of cognitive impairment that characterizes dementia. These men tend to live longer, and their symptoms tend to show up later in life, typically in their late 50s.

Other victims die younger. Their symptoms appear earlier and are neurobehavioral: emotional explosiveness, impulse control problems, violent outbursts, and depression. In the study, this second group of CTE sufferers was twice as large as the first group—yet the proposed settlement's diagnostic program only screens for the cognitive impairment that characterizes the smaller group. In addition, the agreement ignores a series of symptoms associated with both CTE and general brain damage, including visual impairment, chronic pain, chronic headaches, numbness, burning, tingling, incessant ringing in the ears, sensitivity to noise, attention disorders, trouble sleeping, aggression, agitation, impulsivity, suicidal thoughts, and difficulty regulating, expressing, and controlling complex emotions.

Many researchers studying CTE believe doctors will be able to diagnose the disease in living people via biomarkers or brain scans within the next five years. However, the proposed settlement only allows for

changes to its diagnostic criteria in light of scientific advances once every 10 years, and does not allow for any changes to the types of brain damage that qualify for cash awards. There never will be a "Life with CTE" award, no matter how many living, suffering players are eventually diagnosed with the disease.

"The vast majority of players who have what has been traditionally been referred to as post concussion syndrome are not going to receive anything from this settlement—any player who has behavioral problems or emotional issues as a result of concussions is omitted," says Michael Kaplen, a New York-based personal injury lawyer who teaches a brain injury course at George Washington University.

"They're cherry picking what they choose to pay for or not pay for, kicking their responsibility over to someone else."

All of the above figures to significantly reduce the NFL's ultimate total payout to retirees. Neither the league nor Seeger argues otherwise. In court documents filed in support of the settlement, both parties express confidence that an initially proposed and since scrapped \$675 million fund amount would be more than enough to cover all player awards for the next 65 years. During an interview with CBS Sports radio, Seeger also said that he expects between 3,000 and 5,000 retirees to receive cash compensation. Do the math, and that means the average expected award is between \$135,000 and \$225,000—far less than the deal's highly publicized \$1 million-plus maximum amounts.

Why is this significant? Because brain damage isn't cheap. Retirees who can't hold down jobs or keep their families together cost money. Retirees who need feeding tubes and ventilators cost even more money. Frank Neuhauser, the executive director of the Center for the Study of Social Insurance at the University of California, Berkeley, told the Los Angeles Times that dementia and Alzheimer's patients can cost "millions of dollars and can involve 10, 20, 30 years of medical care and income support." University of Toronto neurosurgeon Charles Tator told Medscape Medical News that [the total costs related to repetitive traumatic brain injury](#)—including lost productivity and medical and custodial care—are in the ballpark of \$10 million per case. If the \$9 billion-a-year professional football industry lowballs former players, society will be forced to make up the difference—through Medicare, higher private insurance premiums, and charitable contributions.

When I asked investigative reporter David Cay Johnston about a potentially insufficient settlement last year, [he was downright apoplectic](#).

"You, the NFL, caused this problem," Johnson, a Pulitzer winner and the author of *Free Lunch: How the Wealthiest Americans Enrich Themselves at Government Expense and Stick You With The Bill*, said. "You profited from this problem. You should pay 100 percent of the costs. Imagine somebody was running a company that was knowingly dumping pollution. We would say, 'You have to pay to clean that up.' I think it's unconscionable that taxpayers should be looking at picking up any of this."

In a New York Times editorial [published last fall](#), former NFL linebacker Scott Fujita raised another major problem with the deal. "Is this not an issue of public safety," he wrote, "especially when it comes to children? Did the plaintiffs not deserve to discover exactly what was known by the NFL about head injuries, and when? What about the public?"

Fujita was right. Football-induced brain damage is a public health and safety issue. And the public deserves to know as much possible in order to quantify the medical risks of a sport primarily played not

by a small number of well-compensated adult men represented in collective bargaining by a full-fledged union, but by millions of uncompensated children and college students representing public institutions.

To come up with the settlement's original \$675 million fund cap, both the NFL and the top players' lawyers said in court documents that they consulted with medical experts, actuaries, and economists to produce "thorough analyses" estimating both the prevalence and extent of brain damage in retired players. However, neither party has shown those figures to Brody, **shared them with other player lawyers** or filed them in open court. **Earlier this week**, the league agreed to release its actuarial report contingent on Brody's approval; for now, however, the math remains a mystery.

By contrast, a **proposed NCAA class-action concussion lawsuit settlement** features a detailed report that estimates that of 1.8 million former college athletes who played contact sports—700,000 of them ex-football players—approximately 60 to 350 per year over the next half-century will be diagnosed with either CTE or post-concussion syndrome. Parents trying to **decide whether to allow their child to play football** deserve to see the NFL's numbers as well. So do players.

Ever since Representative Linda Sanchez, a California Democrat, challenged NFL commissioner Roger Goodell while likening his organization to Big Tobacco at 2009 Congressional hearings, the league has attempted to take a leadership role in addressing football-induced brain damage. That's possibly out of sincere concern, probably out of public-relations panic, and likely due to a bit of both. The NFL **has donated \$30 million** to the National Institutes of Health to study brain damage and other health ailments. It has partnered with General Electric on **a \$60 million program** to improve brain injury diagnosis and treatment. It has held safety summits for both **mommy bloggers** and **international sports leagues** alike. Through its youth arm, USA Football, the league is even pushing a "Heads Up" program that **purports to teach children safer tackling techniques**. Yet by buying silence through the settlement, the league also is undercutting its own credibility. Learning exactly what the NFL knew and when it knew it, Kaplen says, is essential for evaluating whether the league can be trusted as an honest broker of concussion information going forward.

Earlier this week, relatives of Seau **announced that they intend to opt out of the settlement** and instead pursue a wrongful death suit filed against the NFL last year. "The family want to know why this settlement seems designed for expediency for the NFL and to ensure that information doesn't come out," Steven Strauss, a Seau family lawyer, told ESPN. "And the Seau family wants the truth to come out. Since this litigation started, there hasn't been one document produced, there hasn't been one deposition taken. It seems very clearly designed to nip this in the bud and not have the truth come out, and that's not acceptable to the Seau family, and it's not acceptable to Junior's legacy." Should it be acceptable to anyone else?

This article available online at:

<http://www.theatlantic.com/entertainment/archive/2014/09/the-nfl-dodges-on-brain-injuries/379557/>

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EXHIBIT 27

Time's Running Out to Stop Bad NFL Concussion Settlement

U.S. District Judge Anita Brody will hold a hearing on November 19th to determine whether or not to grant final approval to a concussion settlement between the NFL and former players.

In mid-October, players had the option of opting out of the settlement and pursuing their own legal remedies. Some did just that, most stayed in, and other groups of players filed court objections to the proposed settlement. The primary objection is that the settlement places unfair limits on who would be eligible for compensation and when.

"The court has its own playbook for managing class action litigation," said Jim Ryan, an employment attorney.

"They look at what the reaction has been since the preliminary approval and see what the objectors have brought forth as to why the settlement is inadequate. A lot of time, just because it was approved at the preliminary stage does not mean it's going to be approved at the final stage. ... The court is going to be very, very in tune to what the objectors are saying."

Nevertheless, most experts believe Brody will finalize the settlement. That likelihood is disturbing on many fronts. For one, under the settlement proposal in front of Judge Brody, players with less severe brain damage caused by repetitive blows to the brain likely won't receive any money from the settlement.

Also, the proposed settlement doesn't address future scientific and medical advances. Currently, chronic traumatic encephalopathy (CTE) can only be diagnosed after death. However, Boston University researcher, Robert Stern, believes an FDA-approved test for CTE will be available within the next decade. That type of scenario isn't addressed in the proposed settlement.

Findings from a study prepared by actuaries hired by the NFL show that nearly a third of retired players will develop long-term cognitive problems and that brain-related problems will likely emerge at "notably younger ages" than in the general population.

"It's a bogus deal," says Kansas City attorney Ken McClain, who represents two dozen former players.

"A fraudulent deal on its face, completely illusory, designed to pay very few people except the lawyers and the players in the most extreme [illness] category. All of these men saddled with neurological problems throughout their lifetimes are not the NFL's concern. The NFL's concern is containing risk, just as if they were [General Motors] and these players are faulty ignitions."

Let's hope Judge Brody gives the concerns of the objectors full consideration.

— Ken Reed, Sports Policy Director, League of Fans

**UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA**

IN RE: NATIONAL FOOTBALL
LEAGUE PLAYERS' CONCUSSION
INJURY LITIGATION

No. 2:12-md-02323-AB
MDL No. 2323

Kevin Turner and Shawn Wooden,
*on behalf of themselves and
others similarly situated,*

Civil Action No. 2:14-cv-00029-AB

Plaintiffs,

v.

National Football League and
NFL Properties, LLC,
successor-in-interest to
NFL Properties, Inc.,

Defendants.

THIS DOCUMENT RELATES TO:
ALL ACTIONS

**MOTION OF SEAN MOREY, ALAN FANECA, BEN HAMILTON, ROBERT ROYAL,
RODERICK CARTWRIGHT, JEFF ROHRER, AND SEAN CONSIDINE FOR AN
ORDER REQUIRING THE NFL TO DISCLOSE CERTAIN DOCUMENTS RELEVANT
TO WHETHER THE SETTLEMENT IS FAIR, ADEQUATE, AND REASONABLE**

Sean Morey, Alan Faneca, Ben Hamilton, Robert Royal, Roderick “Rock” Cartwright, Jeff Rohrer, and Sean Considine (collectively, “Movants”) respectfully move for this Court to order the NFL to disclose certain documents relevant to whether the settlement is fair, adequate, and reasonable.

1. This Court may order the NFL to disclose the relevant documents in its possession particularly where, as here, objectors have been allowed no discovery. *See Manual for Complex Litigation* § 21.643 (4th ed.) (“The important role some objectors play might justify . . . access to information obtained by class counsel.”); *Newberg on Class Actions* § 13:32

(5th ed.) (“[T]he Third Circuit has held that refusal by settling parties to provide access to discovery information is a reason supporting objector discovery.”). Accordingly, Objectors request that the Court order the NFL to produce the following categories of documents forthwith.

Documents Regarding CTE

2. The central allegations of this litigation are that the NFL knew about the link between playing football and brain injuries; fraudulently misrepresented to players the dangers of brain injuries, including CTE; and in connection with that fraud funded sham research. *See generally Turner v. Nat'l Football League*, Civ. A. No. 2:14-cv-29-AB, Dkt. No. 1 (E.D. Pa. Jan. 6, 2014). For example, the Class Action Complaint alleges:

- “The NFL’s **accumulated knowledge** about head injuries to players, and the associated health risks therefrom, **was at all times vastly superior** to that readily available to the Retired NFL Football Players, their Representative Claimants, or Derivative Claimants.” *Id.* ¶ 66 (emphasis added).
- “[F]rom 1994 until 2010, the NFL publicly inserted itself into the business of **head injury research** and openly disputed that any short-term or long-term harmful effects arose from football-related sub-concussive and concussive injuries.” *Id.* ¶ 84 (emphasis added).
- “For decades, the NFL has been aware that multiple blows to the head **can lead to** long-term brain injury, including but not limited to memory loss, dementia, depression, and **CTE** and its related symptoms.” *Id.* ¶ 89 (emphasis added).
- “[T]he NFL engaged in fraudulent and negligent conduct, which included a campaign of misinformation designed to (a) dispute accepted and valid neuroscience regarding the **connection between repetitive traumatic brain injuries** and concussions and degenerative brain disease such as **CTE**; and (b) to create a **falsified body of research** which the NFL could cite as proof that **truthful and accepted neuroscience on the subject was inconclusive and subject to doubt**.” *Id.* ¶ 131 (emphasis added).
- “As a proximate result of the **NFL’s tortious conduct**, the Retired NFL Football Players in the Class and Subclass have experienced an increased risk of developing serious latent neurodegenerative disorders and diseases, including but not limited to **CTE** . . .” *Id.* ¶ 260 (emphasis added).

3. At the fairness hearing, the NFL emphasized that “the science” purportedly “supports the reasonableness of the settlement.” Fairness Hearing Tr. 187. The numerous declarations submitted in support of Objectors refute that assertion. *See Dkt. No. 6455*, at 6-8.¹

4. Given the overwhelming scientific support for Objectors’ position regarding the link between CTE and playing in the NFL, and given the profile of this issue within the NFL for many years, it is reasonable to believe the NFL has documents within its possession and control that reveal its current and historical knowledge regarding the link between CTE and playing in the NFL. Disclosure of the full extent of the NFL’s knowledge about CTE and the link between playing football and CTE will allow this Court to assess whether the NFL’s current position regarding CTE is consistent with the documents in its possession.

Documents Regarding *League of Denial*

5. The NFL should also be required to disclose any documents relating to its interactions with ESPN, Inc. regarding the Public Broadcasting Service documentary and book, *League of Denial*. ESPN originally sponsored the project, but news reports indicate that the NFL pressured ESPN to revoke its sponsorship.² The NFL’s conduct is related to its alleged efforts to poison the well of public knowledge about CTE and the link between football and CTE, and is

¹ In an effort to understand the science that led the NFL and Class Counsel to enter into this Settlement, Objectors have requested discovery in this case. On September 13, 2014, Objectors filed a Motion for Leave To Conduct Limited Discovery. Dkt. No. 6169. The NFL and Class Counsel opposed that motion on October 2, 2014. Dkt. Nos. 6183 (Class Counsel), 6185 (NFL). That motion was denied on October 15, 2014. Dkt. No. 6245. Objectors also filed a Motion for an Order for Class Counsel and the NFL To Produce Evidence on October 21, 2014. Dkt. No. 6252. The NFL and Class Counsel opposed that motion on October 31, 2014. Dkt. Nos. 6332 (NFL), 6333 (Class Counsel). That motion was not formally denied, but the NFL and Class Counsel were not required to, and did not, submit the requested evidence.

² Miller & Belson, *NFL Pressure Said To Lead ESPN To Quit Film Project*, N.Y. Times (Aug. 23, 2013), http://www.nytimes.com/2013/08/24/sports/football/nfl-pressure-said-to-prompt-espn-to-quit-film-project.html?pagewanted=all&_r=2&.

therefore relevant now that the NFL has invoked the supposed immaturity of the science of CTE to defend the proposed settlement.

Documents Regarding Insurance

6. Finally, the NFL should be required to disclose the extent to which its liability for this Settlement will be covered by insurance proceeds. In an effort to avoid having to pay for the Settlement out of its own pocket, the NFL is currently embroiled in litigation with its insurers. *See Discover Prop. & Cas. et al. v. NFL*, Index No. 652933-2012 (N.Y. Sup. Ct. filed Aug. 21, 2012); *NFL v. Fireman's Fund Ins. Co.*, Index No. 490342 (Sup. Ct. L.A. Cnty. filed Aug. 15, 2012); *Alterra Am. Ins. Co. v. NFL*, Index No. 652813-2012 (N.Y. Sup. Ct. filed Aug. 13, 2012). According to the media, if the NFL prevails in these cases, its liability for the Settlement “likely will be paid with a combination of insurer funds and higher prices for game tickets and media rights.”³

7. As noted in Objectors’ supplemental objection, the NFL is a veritable money machine with substantial individual income streams that could be dedicated to enhancing the value of the settlement to the class and providing meaningful care under the Baseline Assessment Program as well as compensation for CTE. Dkt. No. 6420. For example, the NFL will receive almost \$1 billion over the next four years from Verizon Wireless, just for mobile phone streaming rights to Sunday afternoon and playoff games. *Id.* at 6. This Court and the Class are entitled to consider the defendant’s ability to pay in considering the fairness of the settlement, and insurance bears on that.

³ Harrison, *NFL Concussion Settlement Funds Will Come from Insurers and Higher Ticket Prices*, BusinessInsurance.com (Aug. 17, 2014), <http://www.businessinsurance.com/article/20140817/NEWS06/140819894?tags=%257C329%257C75%257C302%257C304%257C92>.

WHEREFORE, for the reasons stated above, Objectors request an order requiring the NFL and NFL Properties, LLC, to disclose: (1) documents showing the full extent of their knowledge regarding Chronic Traumatic Encephalopathy (“CTE”) and its link to playing football; (2) any documents in their possession relating to any interactions between the NFL and ESPN involving the PBS documentary and book *League of Denial*, authored by Mark Fainaru-Wada and Steve Fainaru; and (3) documents reflecting the extent to which insurance may pay for some or all of the Settlement.

Dated: December 9, 2014

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CERTIFICATE OF SERVICE

I hereby certify that on December 9, 2014, I caused the foregoing Motion for Order Requiring the NFL To Disclose Documents to be filed with the United States District Court for the Eastern District of Pennsylvania via the Court's CM/ECF system, which will provide electronic notice to all counsel and parties.

/s/ Steven F. Molo